DOCUMENT RESUME

ED 214 606 JC 820 156

AUTHOR Shabat, Oscar E.; And Others
TITLE Mastery Learning Conference (2nd, Chicago, Illinois, May 27-29, 1981). Summary.
INSTITUTION Chicago City Colleges, Ill.
PUB DATE [81]
NOTE 72p.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Audiovisual Instruction; Behavioral Objectives; *College Instruction; Community Colleges; Computer Assisted Instruction; Educational Technology; General Education; Grantsmanship; Instructional Materials; *Mastery Learning; Mastery Tests; Microcomputers; Teacher Effectiveness; Two Year Colleges; Vocational Education
IDENTIFIERS *Illinois (Chicago)

ABSTRACT

Selected papers presented at the Second Annual Mastery Learning Conference are summarized in this proceedings. First, Oscar Shabat stresses the roles of general education and basic skills instruction in the community college and introduces mastery learning and the conference. Next, Rocco Caponigri reviews the theoretical background of mastery learning and the history of its application at the City Colleges of Chicago. After Thomas Guskey examines the past and future directions of mastery learning, Bruce McDonald describes the evolution of mastery learning in vocational education, especially with regard to its antecedents in military training. Next, Herb Rosing discusses audio-tutorial instruction and its relationship to mastery learning. The potential of the microcomputer in computer-assisted instruction (CAI) is considered by Chris Dimas, who notes the compatibility of CAI and mastery learning. After Ellen Filurin explains the process of developing a concept for a grant and preparing the grant application, Michael Katims and Beau Jones review mastery learning programs in the Chicago public schools, which use the "Chicago Mastery Learning Reading" (CMLR) materials. Jones also provides a checklist for effective mastery learning and instruction. Finally, the implementation and evaluation of mastery learning programs are discussed by Guskey, who cites the concerns of students and faculty. (KL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED214606

Summary: Second Annual Mastery Learning Conference

May 27, 28, 29, 1981

JC 820 156

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Rocco S. Caponigri

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☑ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

City Colleges of Chicago

... I want to challenge you, to move you. I want to make you feel a little out of sorts with yourself because that kind of tension may give rise to new, purposeful, and worthwhile professional activities...

Oscar E. Shabat, Chancellor, City Colleges of Chicago

...We found that students in mastery classes, especially those who fully engaged in the process, achieved higher standards of performance than students in control classes...

Rocco S. Caponigri, Director, Mastery Learning Project
City Colleges of Chicago

...Under Mastery Learning, learning becomes a cooperative rather than a competitive activity...

Thomas R. Guskey, Director of Research, Center for the Improvement of Teaching and Learning, City Colleges of Chicago

...Student motivation and confidence are created and maintained by educational approaches that provide learners with successful learning experiences...

Herb Rosing, Professor of Physical Science, Loop College

...The Air Training Command had such great success using instructional system development, behavioral objectives, and task analysis that the entire Air Force was required to start using these methods in 1970...

Bruce McDonald, Curriculum Materials Developer, Department of Vocational Education Studies, Southern Illinois University

...Using the computer to help with the "busy work' of Mastery Learning will therefore free the teacher to help students on an individual basis to achieve content mastery and understanding of the ramifications of their newly acquired knowledge...

Chris Dimas, Director, Computer Supported Instruction
City Colleges of Chicago

...Each grant moves an institution closer to meeting the goal of better serving its students and the community...

Ellen Filurin, Director, Office of Grants and Program Planning
Chicago City-Wide College

...The philosophy and techniques of Mastery Learning are particularly suited to the instructional and administrative needs of a large school system...

Beau Fly Jones, Consultant to the Curriculum Department, Chicago Board of Education

TABLE OF CONTENTS

SECTION I	Introduction	Page 1
SECTION II	General Education in Community Colleges: Oscar E. Shabat	Page 3
SECTION III	Mastery Learning in the City Colleges of Chicago: Rocco S. Caponigri	Page 6
SECTION IV	Mastery Learning: Past and Future Directions: Thomas R. Guskey	Page 20
SECTION V	Mastery Learning in Vocation Education Bruce McDonald	Page 24
SECTION VI	Mastery Learning and The Audio-Tutorial Approach to Learning: Herb Rosing	Page 38
SECTION VII	Mastery Learning and the Microcomputer Chris Dimas	Page 42
SECTION VIII	The Grant Application Process: Ellen Filurin	Page 46
SECTION IX	A Technology for School Improvement: Michael Katims & Beau Jones	Page 51
SECTION X	A Checklist for Effective Mastery Learning/Strategy Instruction: Beau Jones	Page 58
SECTION XI	The Implementation and Evaluation of Mastery Learning Programs: Thomas R. Guskey . . .	Page 62

THE SECOND NATIONAL MASTERY LEARNING CONFERENCE: INTRODUCTION

This is a summary of the Second Annual Mastery Learning Conference sponsored by the City Colleges of Chicago that took place May 27, 28, and 29, 1981, at The Palmer House in Chicago. Both theoretical and practical orientations to Mastery Learning were presented at the Conference to some 200 teachers and administrators representing colleges and universities throughout the United States.

That event is history. Now we can look forward to the Third Annual Mastery Learning Conference scheduled for May 26, 27, and 28, 1982, again at The Palmer House in Chicago. The featured speakers will be James H. Block, Associate Professor of Education, University of California, Santa Barbara, and Benjamin Bloom, Distinguished Service Professor of Education, The University of Chicago, and Professor of Education, Northwestern University. In addition to emphasizing the theoretical and practical aspects of Mastery Learning, an added feature will be special sessions directed to instructors who already have been implementing Mastery Learning strategies over the past few years.

The 1981 Conference's plenary sessions concerned Mastery Learning theory. Oscar E. Shabat, Chancellor of the City Colleges of Chicago, welcomed participants. Practical considerations in implementing the theory of Mastery Learning at the City Colleges were provided by this writer. Thomas Guskey, Director of Research, Center for the Improvement of Teaching and Learning, City Colleges, provided additional background on the theory of Mastery Learning and suggested future directions for research in the subject. Bruce McDonald, Curriculum Materials Developer, Department of Vocational Education Studies, Southern Illinois University, described the evolution of Mastery Learning in civilian and military vocational education.

Chris Dimas, Director of Computer-Supported Instruction, City Colleges of Chicago, and Herb Rosing, Professor of Physical Science, Loop College, outlined the uses of microcomputers and audiovisual materials in Mastery Learning. Ellen Filurin, Director of Grants and Program Planning, Chicago City-Wide College, explained how grants

could be obtained for Mastery Learning projects. Beau Jones, Consultant to the Curriculum Department, Chicago Board of Education, told how the program is used in the Chicago public school system.

Summaries of the above presentations can be found in this Conference report.

In addition to hearing about the theoretical background, Conference participants attended workshop sessions to discuss how to develop Mastery Learning materials. Persons in the first workshop focused on selecting topics and developing units, daily lessons and homework assignments. Those in the second workshop covered the concept of writing effective objectives for specific lessons. Participants in the third workshop discussed formative evaluations and retakes, while those in the fourth workshop developed summative evaluations and explored setting standards of performance. Each of these workshops was designed not only to provide the participants with Mastery Learning materials but also to show them how they can create materials of their own.

This second conference is the outgrowth of the City Colleges of Chicago Mastery Learning Project which began using these new techniques in 1972. Since then, 35,000 students have enrolled in Mastery Learning classes and 450 faculty members have been introducted to Mastery Learning. Now the Mastery Learning Project is part of the Center for the Improvement of Teaching and Learning at the City Colleges. Center staff members are exploring, researching and developing effective teaching techniques in the community colleges.

The writer thanks the following persons who contributed their support and encouragement in helping to make the Second Annual Conference a success. The list includes Chancellor Oscar E. Shabat; Hymen M. Chausow, Senior Vice Chancellor, City Colleges; Salvatore G. Rotella, President, Chicago City-Wide College and Loop College; Don Barshis, Operations Director, Center for the Improvement of Teaching and Learning; Margaret Matheis, Tom Ryba and Pat Hunter, who helped at the Conference; and the speakers mentioned above and each of the workshop leaders, without whose efforts the Conference wouldn't have been possible. Thanks are also due to Robert Thiersch, Associate Professor and Chairperson of the English Department at Loop College, and Sy Friedman, Director of Public Information for the City Colleges of Chicago, for assistance in preparing this report; Sandra DeVito for the cover; Mable Benjamin for typing this report; and Mark Schumann and Penelope Schaefer for their many contributions.

Rocco S. Caponigri, Director
Mastery Learning Project
City Colleges of Chicago

GENERAL EDUCATION IN COMMUNITY COLLEGES

BY
OSCAR E. SHABAT, CHANCELLOR
CITY COLLEGES OF CHICAGO

I wish to welcome all of you — particularly those of you who have traveled here from other cities — to Chicago and the Second Annual Mastery Learning Conference. My remarks will center around three inter-related points: First, general education in the community colleges; second, teaching basic skills to community college students; and, third, Mastery Learning and the purpose of this conference.

... Toward General Education ...

All of you teach your students how to read and write, but read and write what? Of course, our students can be taught reading and writing and math skills as if they were in a trade school but we do not want to do that. I would be one of the first to join with my colleagues to fight the attempt to make us a trade school. In addition to teaching students these basic skills, we have to teach our students what it means to live in a democratic and free society. And that is where general education comes in. The Carnegie Foundation recently published A Quest for Common Learning, an essay by Ernest L. Boyer and Arthur Levine, that discusses the aims of general education. To them, general education and vocational education are not at odds. In a society where basic job skills change so rapidly, the best kind of vocational training may be general education. Thus, even though we cannot complete the task of general education in the community college, we must begin it.

... Communication ...

Boyer and Levine propose that general education should concern itself with those shared experiences that strengthen human relationships, common bonds, and the quality of life. It should concentrate on those experiences that knit individuals to a community. Boyer and Levine identify six broad subject areas of general education. The first is "Shared Use of Symbols." Students must learn to read with understanding, write with clarify, listen and speak effectively, and become proficient with numbers. General education also should include the study of a second language and the language of the computer, as well as the study of mass communication.

... Groups and Institutions ...

The second subject area is "Shared Membership in Groups and Institutions." All students should learn about their shared membership in groups and institutions. Boyer and Levine suggest that the general education curriculum should look at the origin of institutions, how they evolve and grow strong or become oppressive or weak -- in other words, how they work. It should explore the interaction between institutions and individuals, and show how such interaction both facilitates and complicates our existence.

... Mutual Dependence ...

The third subject area is "Shared Producing and Consuming." Students must come to understand that everyone produces and consumes, and that through this process we are dependent on each other. A general education program should explore the significance of work and leisure in the lives of individuals, and how work and leisure reflect values and shape the social climate of a culture. This would not be a vocational or a recreational course, but a legitimate and demanding part of a general education curriculum.

... Nature, Science and Technology ...

The fourth area, a "Shared Relationship with Nature," used to be called natural sciences. Students should learn about the elegant underlying patterns of the natural world, and that all elements of nature are related to each other. Students must come to understand how, through

observation and testing, theories are found, refined, sometimes disregarded, or give rise to other theories. Students should learn about the applications of science and see how scientific discoveries have led to a flood of inventions and new technologies that have brought people both benefits and risks.

... Sense of History ...

The fifth broad subject area is a "Shared Sense of Time." Boyer and Levine propose a study of our common heritage that would focus on the seminal ideas and events that have decisively shaped the course of history. This approach would emphasize the convergence of social, religious, political, economic, and intellectual forces. Indeed, intensively exploring a few themes across disciplinary lines would accomplish more than simply conveying facts or ideas.

... Values ...

The sixth area is "Shared Values and Beliefs." All individuals and societies are continuously making choices, revising their standards of conduct, debating "right" and "wrong," deciding what is good and what is best. All students should examine the distinctions we make between beliefs and "facts," as well as how values are formed, transmitted, and revised. Each student should be able to identify the premises inherent in his or her own beliefs and learn how to make moral and ethical decisions. A study of the personal and social significance of shared values should be the capstone of a general education. I've dwelled more on general education than perhaps you think I should at this type of conference, but I think what we'll be doing will be empty unless we do it within the context of general education.

... Basic Skills ...

My second point centers around the definition and solution to the biggest problem we face today. I belong to an informal group of chancellors and presidents of big-city community college systems. We meet, tour each district, and share our common concerns. What is the big problem we all face? It is the way in which the public community colleges are failing the new, highly diversified type student we are getting, and our failure shows up in our tremendous attrition rate. Many of our students are experiencing frustration and a sense of failure. Most are adults; they make a commitment and a sacrifice and come to college to get their chance at post-secondary education, their equality of opportunity. However, they haven't been getting a fair chance. If it gets to be more widely known that we are not doing the job, we will not continue to get the support of the public. If we don't serve these students, someone will come along ingenious enough to create another institution that will.

Suffice it to say that many of our students have poor reading, writing and math skills; it's just that simple. They lack the basic skills that we think are essential. How do you get students who read below the sixth grade level to a point where they can succeed in college-level courses? There are all kinds of remediation and development schemes -- we've tried them all over the years. We've failed in most of them. We've looked at the literature. Who has the answers? We're all looking; we're all searching, but so far, we haven't found them yet.

... Teaching/Learning Techniques ...

There are many people in community colleges here and throughout the United States who through their own study, experience, ingenuity, and creativity have developed many new teaching techniques, including Mastery Learning. Dr. Bloom and his students have shown that 80 per cent of our students can achieve the degree of proficiency now achieved by only the top 20 per cent — just by using a certain process of instruction -- without changing standards, without changing the size of the class, without changing the number of meetings per week. Now, that's a tall order, but we've got the results and you'll see some of them. There is still room for improvement, and that's our job now.

... The New Center ...

My third point has to do with Mastery Learning and this conference. This whole conference is about Mastery Learning, so I won't go into the details. Dr. Rocco Caponigri continues in his leadership position, and works to refine Mastery Learning, which is the theme of this conference. Also, we just inaugurated the Center for the Improvement of Teaching and Learning, and Dr. Thomas Guskey, from the University of Kentucky, will direct the Center's

research. In the community colleges we are normally teaching oriented. In our new Center, we will concentrate on research. Don Barshis will direct the operations of the Center. We want to see what we can learn about effective teaching and learning.

... Conference Challenge ...

You're probably wondering what general education has to do with this conference, and I want to connect it with what I've just said. I started to talk about general education by pointing out that we have to be concerned about the content of education as well as the skills. You're going to have to decide what to include in general education courses, including the materials your students will study. But before loading up your students with $50 or $100 worth of books, most of which they won't read, you're going to have to write them. The textbook publishers won't do it for you. In short, we've got to do it for our student with audio-visual materials and all the rest as well. Take one example, John Dewey's Human Nature and Conduct; it's brilliant, and if you read it for the twelfth time you'll discover more about it. There's no point trying to write a substitute for it, but we must explain it to our students, and do it in a way that makes them want to go and read it for themselves. Nothing can be more important than being able to read critically and with understanding. Let me tell you about a 73-year-old man, the valedictorian of a recent graduating class. His whole speech took only a few seconds. He said, "For 72 years I didn't know how to read, and I was blind, I was deaf. Now, I can see and I can hear. The world is open to me. That's the power of the written word. I'm free." That's all he said, and he said it all.

Thinking about teaching and developing materials is what this conference is about. I want to challenge you, to move you. I want to make you feel a little out of sorts with yourself because that kind of tension may give rise to new, purposeful, and worthwhile professional activities. That means rolling up your sleeves and writing and working for all kinds of students, and then whetting their appetites and stimulating them to work harder and read more. There is no substitute for the ability to read, for the ability to communicate with other human beings about the ideas that are important to us, and about the ideas we hold in common. I'm asking you to work as hard as you can while you're here.

MASTERY LEARNING IN THE CITY COLLEGES OF CHICAGO

BY
ROCCO S. CAPONIGRI, DIRECTOR
MASTERY LEARNING PROJECT
CITY COLLEGES OF CHICAGO

... Definition ...

What is Mastery Learning? Mastery Learning is a teaching/learning strategy used in the traditional classroom that emphasizes the mastery of specific information and skills. Its goal is to have almost all students reach the high degree of learning previously attained only by the "A" students. It is entirely practical to have 80 percent of the students reach the level usually attained by the top 20 percent. By dividing a course into specific units with definite objectives, and by providing frequent feedback and alternative learning experiences, Mastery Learning helps all students learn the way the best students learn.

Dr. Benjamin Bloom, Swift Distinguished Service Professor at the University of Chicago, who is the principal proponent of the mastery strategy we use in the City Colleges of Chicago, defines Mastery Learning more broadly. In his book, Human Characteristics and School Learning, he states that: "Mastery Learning is the notion that most students can learn what the schools have to teach; (that is) ... most students can attain a high level of learning capability if instruction is approached sensitively and systematically, if students are helped when and where they have learning difficulties, if they are given sufficient time to achieve mastery, and if there is some criterion of what constitutes mastery." Thus, it is clear that Mastery Learning is as much a philosophy of learning as it is a technique of teaching.

... Early History: Pre-1900's ...

Before going into the practical applications of Mastery Learning, we want to trace the development of the Mastery concept. For centuries, educators have believed that a teacher's job was to find ways and means of causing students to learn. Historically, teachers found themselves in one of two situations: either they taught students one on one, and they were called tutors, or they taught students in groups, in which case they were called teachers. In both cases the object was the same for a student to learn what the teacher was trying to teach. However, the two methods produced dramatically different results.

"Tutors" were generally successful in reaching their goals. "Teachers," it seemed, had much less success, and most people came to believe that only a small proportion of the students in a given group could achieve a high standard of performance. Bloom (Human Characteristics and School Learning; pp. 2&3) states that the Jesuits before the 17th century, as well as the philosophers Comenius, Pestalozzi and Herbart in the 17th, 18th and 19th centuries, all believed that most students could and should learn what the schools had to teach.

... Early 1900's ...

In the first quarter of the 20th century, Carleton Washburne and his associates in the Winnetka Plan for the Winnetka Public Schools, and Henry C. Morrison at the University of Chicago's Laboratory School experimented with the Mastery concept. These two programs differed in that the Winnetka Plan was "student paced," while Morrison's plan was "teacher paced." According to Washburn, a student had to master a particular unit before moving onto subsequent units. In many ways, the Winnetka Plan seemed similar to what we now refer to as Keller's Personalized System of Instruction.

Morrison's plan, on the other hand, utilized what we currently call "correctives" to keep the students moving along at a pre-set pace. Each approach utilized well-defined units, specific objectives and diagnostic tests and each approach assumed that all or most of the students would achieve mastery. For a variety of reasons, neither of these approaches were widely accepted by the educational establishment at that time.

... Individualization ...

The concept of mastery was reborn with the work of B. F. Skinner (1954), who reemphasized the importance of specific reinforcement to enhance learning. His work gave birth to individualized instruction using teaching machines, which, in turn, caused all teachers to look more closely at the learning process. No matter how teachers felt about Skinner, they began to realize that success in the classroom was closely related to the ability to individualize the instructional process.

... Audio-Tutorial ...

In 1961, Dr. L. N. Postlethwait developed a technique which he called "The Audio-Tutorial Approach to Learning." This approach offered the "maximum educational opportunity to students of every background and level of aptitude or skill, even within the framework of a large, multi-section class (300 - 500 students)." His method centered upon supervised self-instructed laboratories with a corresponding shift from lecturing to individualized learning.

The Postlethwait approach included independent study sessions, general assembly sessions, small assembly sessions and quiz sessions. This approach was well received by students and educators and is being used presently in many schools. Also, many publishers are now offering audio and video tapes as well as programmed books to accompany text books.

... Theoretical Foundations ...

In 1963, John Carroll, working in the field of language, formulated his "Model of School Learning." Many first-time readers of Carroll's article in Columbia's Teacher's College Record immediately recognized the simplicity, uniqueness, and profundity of his concept: simple, because it had only five variables; unique, because all variables in the model were related to a single quantifiable variable, time; profound, because it defined learners not as "good" or "bad" but as "fast" or "slow," and because it introduced the corollary that aptitude is proportional to learning rate, which implies that most students can learn what the schools have to teach if they spend the time they need on each learning task.

Carroll's basic tenet is that the mastery of a particular learning task is a function of the ratio of the time the student spends learning to the time he needs to learn that task.

In turn, the time spent in learning is a function of the opportunity-to-learn and the student's perseverance. The time needed to learn is a function of the student's aptitude for that particular learning task, his ability to understand the instruction for the task, and the quality of the instruction he receives. Let us carefully define and explain our terms.

In community colleges, the opportunity-to-learn is constrained by two factors: first, the actual amount of time the college makes available to the student and, second, by the real time available in the student's daily routine. Urban students, for example, may have only limited time available outside of the classroom because of their jobs and family responsibilities.

Another variable affecting the time the student spends in the process of learning is perseverance or the amount of time the student spends in active learning. Perseverance is a quantifiable measure of student motivation. Most important, perseverence seems to be a direct result of some previous success. In short, those students who succeed early on will more likely spend time and effort on subsequent tasks, while students who fail will do just the opposite.

The ability to understand instruction is the ability to understand the nature of the task to be learned and/or the procedure to be followed in learning that task. Generally, in our classrooms, the ability to understand instruction and instructional materials is highly correlated to verbal ability. This fact plays an important part in modifying instruction: good teachers are constantly monitoring whether or not they are getting through to their students.

In Carroll's model, aptitude is defined as the amount of time the student requires to attain mastery of a particular learning task under optimal learning conditions. This is a significant departure from the traditional definition of aptitude, namely, that aptitude is the result of innate ability. According to this theory, individuals will either have the ability to learn a specific task or they will not. However, if we use Carroll's definition of aptitude, we do not classify our students as either able to learn or not able to learn. Instead, we classify students as slow learners and fast learners, and we can then adjust

the learning experience accordingly. In other words, according to Carroll, aptitude is a measure of learning rate.

Finally, and most importantly, the quality of instruction significantly affects the time a student needs to learn. In Carroll's model, quality of instruction includes the way in which the task to be learned is organized and presented. For example, the learner must know what he is to learn and how he should go about learning it. Also, the various aspects of the tasks to be learned should be ordered so that every step is adequately prepared for by a previous step.

Bloom and his students at the University of Chicago found in Carroll's model a starting point for what was to become known as Mastery Learning.

Bloom's model contains three interdependent variables: first, there is the extent to which the student has already learned the prerequisites of the learning to be accomplished. Bloom calls these the "cognitive prerequisites" of the learning task, and claims that variations in cognitive prerequisites account for 50 percent of the variance in final grades.

... Affective Characteristics ...

The second variable is the extent to which the student is motivated to engage in the learning process. Dr. Bloom calls these the "affective characteristics" of the student. He finds that affective characteristics account for 25 percent of the variance in final grades. Finally, there is the extent to which the mode of instruction is appropriate to the learner. This variable is generally labeled "quality of instruction;" it accounts for 25 percent of the variance in final grades. Collectively, these three factors account for about 90 percent (not 100 percent because of the interdependence of the variables) of the variation in final grades. Bloom's model may be depicted thus:

... Learning Outcomes ...

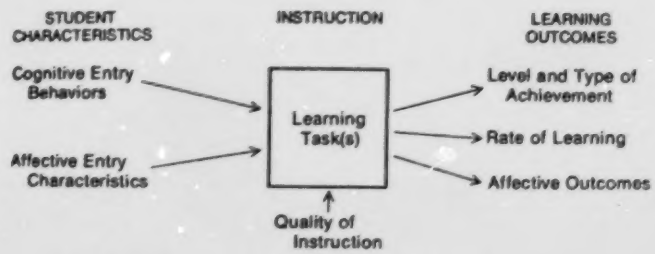
A student comes to a learning task with both an established set of cognitive entry behaviors and affective entry behaviors. Thus, quality of instruction is crucial; as the quality of instruction improves, so do the learning outcomes. These learning outcomes may be characterized as (a) the level and type of achievement, (b) the rate of learning, and (c) the affective outcomes associated with the learning. Using mastery learning strategies, we find that the rate of learning increases as the student gains prerequisite knowledge. His aptitude for and his performance in that subject also increase, thus improving his affective behavior as well.

... Cognitive Entry Behavior ...

"Cognitive entry behavior" refers to the prerequisite knowledge, skills, and competencies that are essential to the learning of a particular task. In terms of measurable variables, we assume that much of the variation in the learning of any particular task may be attributed to variation in the cognitive entry behaviors and the student's achievement prior to undertaking the new learning task. Most teachers believe that variations in the end product are due, at least in part, to variations that existed from the beginning.

... Affective Entry Behavior ...

In discussing "affective entry behaviors," we assert that individuals vary in what they are emotionally prepared to learn, as expressed in their interests, attitudes, and in their self-concept. For a student to accomplish a learning task, he should have an openness to the new task, some desire to learn it well, and sufficient confidence in himself to put forth the energy



MAJOR VARIABLES IN THE THEORY OF SCHOOL LEARNING

12

necessary to overcome difficulties and obstacles. Because of past experiences, many of our students don't believe that they can master their subjects.

... Self-concept ...

A major influence on affective behavior is how students perceive their competence. Because grades, no matter how accurate or biased, are used as indicators of learning competence, most of the affective consequences we deal with are influenced directly by these measures of school achievement. It follows, then, that if grades are used as a measure of achievement, they ought to reflect some definite achievement. Teachers who are "easy markers," for example, are deluding themselves, not their students, into a false sense of accomplishment. There is no need for such deceit in a mastery class. If a student is given an "A," it is because he has demonstrated mastery of certain, clearly defined learning tasks. Having demonstrated such mastery, his or her self-esteem rises dramatically.

... Quality of Instruction ...

Stripped to its essentials, "quality of instruction" involves the cues or directions that teachers provide to the learner, as well as the participation of the learner in learning activities (whether covert or overt), and the feedback the learner receives. One of the key problems in the City Colleges of Chicago is getting students to participate. No matter what instructional strategy teachers use, students will not learn if they do not participate.

... Minimal Changes in Classroom Routine ...

As we further examine the theoretical basis for Mastery Learning and the methods for implementing the variables of Carroll's model, we see that these methods are accessible to educators. Implementing the mastery model is relatively easy because only minimal changes in the usual classroom routine are required. Although some training in mastery techniques is necessary before a teacher can teach a class using Mastery Learning, none of the techniques are difficult to use or are unfamiliar to a traditionally trained teacher.

... Keller ...

Paralleling the work of Bloom is the work of F. S. Keller. In his paper "Good-Bye, Teacher" (1968), Keller describes five features of the "Keller Plan," or as it has become known, "the Personalized System of Instruction." These features are:

1. Mastery level performance,
2. Student paced,
3. Quizzes administered by student-proctors,
4. Development of specially prepared study guides what is to be learned and how it is to be learned and
5. Periodic lectures for motivation and stimulation.

The Keller Plan differs from Bloom's model in that Bloom's model attempts to achieve mastery within the framework of the traditional classroom. Bloom's mastery is teacher-paced, and the task to be learned is presented in the usual way. Also, whereas in Keller's model the individualization is there from the start, in Bloom's model the individualization takes place in the formative-corrective feedback cycle but more about this when City Colleges of Chicago's Mastery Model is described.

... Caponigri ...

In 1969, using Bloom's "Learning for Mastery" (1968), I developed an intensive mastery model in my dissertation, entitled "Capsulized Mastery Learning." Capsulized Mastery Learning involved specific lesson objectives and lesson quizzes with immediate feedback. By using Mastery Learning in a graduate course in statistics, the teacher was able to get 21 out of 22 students to achieve an A. (The other student was from a foreign country and had difficulty understanding the material; however, with intensive tutoring, she received a B.) The standards for grades were in this case taken directly from an earlier course taught by the same professor. The earlier course's grade distribution was bell-shaped, with most students getting C's and a few getting A's and F's, with the same number of students getting B's and D's. Getting 21 out of 22 students to earn an A was a significant improvement, and since that time I've been a supporter and user of the Mastery Learning Model. This, plus my classroom experience, led to the directorship of the Mastery Learning Project.

... Background of the Colleges ...

To provide you with a framework in which to assess our efforts to institutionalize the Mastery Model into the City Colleges of Chicago, I want first to give a brief sketch of the City Colleges and then a more extensive presentation of the implementation of Mastery Learning into City College classrooms. The City Colleges of Chicago (CCC) is a multicollege institution serving more than 114,000 full-time and part-time students. CCC faces the same problems confronted by all big city community colleges: declining enrollment, maintaining academic standards, poorly prepared students, high drop-out rates, skyrocketing costs and a decline in faculty morale.

CCC consists of seven traditional community colleges plus the non-traditional Chicago City-Wide College (CCWC) and the pre-college Chicago Urban Skills Institute (CUSI). CUSI serves 45,000 students, including voc-tech students, foreign-born adults who need English language skills, persons in GED courses, and adults enrolled in high school level reading, writing, and mathematics classes. CCWC is a non-traditional college that develops and oversees special programs for students. These include radio and television courses, course-by-newspaper, testing and assessment, military overseas program, PLATO, Faculty and Staff Development and such projects as Mastery Learning. The Mastery Learning Project, for example, is based at CCWC, with programs at the other colleges.

The "typical" student is a black woman in her mid-twenties who works, maintains a home, and attends school part-time. Approximately 57 percent of CCC students are black, 28 percent are white, 6 percent Hispanic, and the remainder, other minorities. Excluding CUSI and the Adult Education Program, about 58 percent of our students are part-time, 54 percent are female, and 33 percent receive some form of financial aid. Excluding CUSI, the full-time (15 credit hour equivalent) enrollment is approximately 42,000.

... Phase I: 1972-1975 ...

Mastery Learning was introduced in the City Colleges in 1972, after Emmett Jones, Professor at Olive-Harvey College, one of the City Colleges, received a grant to do research on the effectiveness of Mastery Learning at the community college level.

Although Mastery Learning strategies had been developed and utilized by individual instructors throughout the CCC system since 1969, it was not until 1972 and the infusion of Federal funds under Title III of the 1964 Higher Educational Act that a unified effort began. The program began in 1972-1973 with four faculty members, two in mathematics and two in biology. In 1973-1974, nine faculty members were added, and in 1974-1975, seven more. By 1975, the following disciplines were represented: architecture, electronics, nursing, speech, Black studies, English, humanities, accounting, social science, economics, foreign language and chemistry. We found that students in mastery classes, especially those who fully engaged in the process, achieved higher standards of performance than students in control classes. And these higher standards were achieved without producing a higher rate of attrtition.

All of these initial efforts were held at Olive-Harvey College. Because of the positive results of this early work, the CCC central administration decided to attempt to institutionalize the Mastery Learning concept by expanding the program to the other colleges. This marked the beginning of Phase II.

... Phase II: 1976-1977 ...

In the spring of 1976, about 80 CCC instructors were brought together in a workshop in Mastery Learning at the University of Chicago where Dr. Bloom explained the theory and application of Mastery Learning. Instructors were divided into groups according to their subject area: biology, counseling, English composition, history, mathematics, nursing, psychology, reading, and Spanish. Instructors then worked in groups to develop formative test items, correctives and summative test items for use in their subject areas. During the 1976-1977 academic year, the Mastery Learning Project involved 2,211 students in 77 classes taught by 37 instructors. During this phase, efforts were focused on answering two key questions: are Mastery Learning strategies more successful in improving student performance and in reducing attrition than non-mastery techniques? Is Mastery Learning equally successful in all subject areas?

Faculty who participated in this phase of the project were asked to teach at least one section using Mastery Learning plus another section employing the technique they traditionally used. When the mastery class were compared to the

traditional classes - despite large variations among individual instructors and classes -- the comparison showed that Mastery Learning techniques were superior to non-mastery techniques, both in increasing achievement and in reducing attrition.

... Phase III: 1977-1978 ...

Encouraged by the success of the first two phases of the Mastery Learning Project, the CCC central administration decided to offer another workshop during the summer of 1977 under the auspices of the Center for Instructional and Staff Development of Chicago City-Wide College. This marked the beginning of Phase III, which was characterized by an increasing administrative commitment toward efforts to institutionalize Mastery Learning. Thirty-five faculty members participated in this workshop. Teachers were still asked to teach a mastery and a control class. To help faculty cope with the clerical work of their mastery classes and to help them monitor student progress, teachers were provided with (CETA) Mastery Learning Managers. During Phase III, Mastery Learning was introduced to 27 additional classes and 892 more student in these disciplines: accounting, shorthand, business machines, typing, electronics, child development, English grammar, humanities, physical science, music, science, geography, sociology, psychology, history, Spanish, and nursing. The results indicated that teachers new to Mastery Learning need time to become familiar with mastery techniques before the performance of their students improves. Attrition rates, however, declined in all of the classes taught by teachers new to mastery learning.

... Phase IV: 1978-1979 ...

The first three phases of the Mastery Learning Project focused on introducing Mastery Learning to CCC faculty. Phase IV was characterized by a major commitment by the CCC administration to establishing a structure for the day-today management of the project. At each College a faculty member acted as coordinator for the Mastery Learning activities at that College, such as training Mastery Learning Managers and assigning them to mastery teachers. On-going activities carried out at a central level included data collection and analysis, research, training new mastery teachers, and publishing a newsletter. The Mastery Learning Project's mission is to promote the adoption and utilization of Mastery Learning techniques, to encourage the modification of these techniques whenever necessary, and to establish and maintain a Mastery Learning Library.

In the first three phases of the Mastery Learning Project (1972 to 1978), mastery classes, regardless of the subject, were more successful than control classes in improving student performance and lowering attrition rates. Thus, Phase IV, which began in the Fall of 1977 with 120 teachers teaching 187 courses, sought to answer a broader question: Can Mastery Learning be instutionalized? That is, will a sufficient number of teachers use Mastery Learning so that students can begin to select courses using this technique? Also, can the long prevailing attitudes of some administrators and teachers be changed? And will teachers be willing to put forth an extra effort for a long period of time?

Unlike the previous phases, where only the original participants at Olive-Harvey College plus those new mastery teachers who also participated in a CCC workshop were identified as mastery teachers, during Phase IV we included all CCC faculty who developed and used mastery techniques in their classes.

Phase IV also varied from the previous phases in that teachers were not asked to teach control classes. Instead, classes taught by non-mastery teachers were used for comparisons. Though this makes a direct comparison of mastery-control pairs impossible, it does allow a meaningful comparison of the mastery technique with other techniques.

In the Fall Semester 1978, 120 teachers elected to teach 187 mastery classes. In the Spring Semester 1979, 161 teachers elected to teach 216 mastery classes. The 403 mastery classes (with 11,522 students) had 6 percent fewer F's, W's, and Z's and 6 percent more A's and B's than the comparison classes.

... Phase V: 1979-1980 ...

Up to this point the differences in performance and attrition had not been as large as predicted by Mastery Learning theory and by microstudies, including those conducted at Olive-Harvey College. Research reported in "Modification and Discontinuence of Mastery Learning Strategies" (Froh and Muraki, 1980) demonstrated that many Mastery Learning faculty modified components of Bloom's Mastery Learning model. In Phase V, we began to examine more closely the components of the model to determine which

contributed most to effective teaching and learning in the City Colleges of Chicago. We developed a questionnaire, the Mastery Learning Teaching Methods Scale, and a Measure of Teaching Effectiveness in order to carry out this study. The data from these questionnaires are being analyzed and will be reported later. Performance and attrition data for Phase V generally followed the pattern of the previous phases, with mastery classes showing improved student performance and decreased attrition.

During the Fall Semester 1979, 120 CCC faculty taught 195 mastery classes. During the Spring Semester 1980, 129 CCC faculty taught 229 mastery classes. In this academic year, 11,602 students enrolled in 424 mastery classes. Data from 1,602 non-mastery classes were averaged to make comparisons with the mastery classes. The non-mastery classes were matched to the mastery classes by college department and course. Overall, 37 percent of the students in mastery classes received F, W, or Z grades, whereas 40 percent of the students in non-mastery classes received these grades. Attrition was lower in mastery classes at six of the seven colleges. Also, 7 percent more students earned A's and B's in mastery classes than in non-mastery classes. Overall, in 84 percent of the comparisons, students in mastery classes performed better and had lower attrition rates than students in regular classes. However, the differences are not as large as predicted by some of the microstudies reported in the literature.

... Implementation in the Classroom ...

In the City Colleges of Chicago, teachers who use Mastery Learning must go through two distinct phases: (1) the Materials Development Phase and (2) the Implementation Phase. In the Materials Development Phase, all of the materials for a mastery class are developed prior to the beginning of the course. In the Implementation Phase, teachers perfect the routine they must follow to effectively and efficiently use Mastery Learning in their classroom.

The chart in the next column shows the Classroom Implementation Process. For the chart on the Masterials Development Activities, see page 15.

Classroom Implementation Process
Orientation to Mastery Learning
Standards for Grades
Group Presentation
Homework
Unit Formatives
Correctives
Small Group Sessions
Retake Formatives
Abilities Checklist
Summative Evaluation

... In-service ...

In the City Colleges of Chicago, teachers developed and trained to use mastery techniques in Mastery Learning workshops not unlike the one we've planned for you today. By attending such workshops, our faculty earn three credit hours towards lane (salary) advancement. In addition, they must develop Mastery Learning materials for use as part of a mastery strategy in the classroom in at least one course for one semester.

... Course Goals ...

As shown in the chart, one of the first activities in the materials development stages is the development of course goals. Course goals are derived mainly from the following sources:

1. from the needs of students
2. from the demands of society or community
3. from the requirements of potential employers
4. from the College (traditional course goals and descriptions)
5. from the philosophy, attitudes and practices of the teacher and his colleagues
6. from statements and studies conducted by local, state and national organizations
7. from the requirements of sub sequent upper level courses
8. from the psychology of learning the particular subject and
9. from text book publishers.

I suggest you re-read Ralph Tyler's Basic Principles of Curriculum and Instruction (1949).

... Topic Selection ...

After the goals of a course have been established, the teacher should select the subject matter topics to achieve his/her goals and arrange the topics in the order he/she wishes to teach them. Usually the topics are selected from a text book. However, teachers are encouraged to spend as much time as necessary in selecting, evaluating, and ordering the appropriate topics. The experienced teacher will rely heavily upon the knowledge of his students in developing the best order. Many teachers will want to abandon the traditional ordering of topics in favor of a sequence that might intrigue or motivate students. The proper selection and sequencing of topics can often times make the difference between success and failure.

... Units ...

The next step is to divide the topics into units, with each unit taking about two weeks of class time. Generally, teachers use the natural breaks in a subject matter as a guide in developing these units. Often units correspond to a chapter or chapters in a text. Our experience indicates that the optimum number of units for a semester course is between 6 and 10.

... Objectives ...

After the topics are divided into units, teachers should write the objectives for each unit. We recommend that students be given specific objectives for each class period. These objectives will form the basis for the formative test-corrective-feedback cycle, which is essential in an effective mastery course. For these objectives to be useful, they must be written clearly and explicitly. Robert Mager, in Preparing Instructional Objectives, has developed a useful format for stating objectives. He says that good objectives clearly specify what constitutes, and under what conditions, acceptable student performance. To be useful to students, objectives must state what is expected of them as clearly and completely as possible. For example, the objective to know the alphabet is not as meaningful to the student as the objective write the alphabet in order from A to Z; better yet is the instruction to write the alphabet from A to Z in capital letters with 90 percent accuracy in one minute. Given this information, students will be better able to guide their studies, and teachers will be better able to structure or modify the learning experience.

... Homework ...

Selecting and assigning homework assignments is an extremely important activity - one which is too often forgotten. For community college students we recommend that homework:

1. be assigned for each class period,
2. be collected and recorded at the beginning of every class (long assignments should be broken up so that students can show steady progress toward completion),
3. be directly related to the objectives of the class period or unit,
4. be structured so that it can be completed in the time the students have available and
5. be done in small groups - at home if possible.

Students often regard reading as a non-assignment to be put off. Students are more likely to read if they are required to do something like underline the most important sentence in the paragraph, or to write the most important idea on the page, or even to outline the story.

... Formative Evaluations ...

Formative evaluations are designed to evaluate and to improve the teaching/learning process. In their most familiar form, formative evaluations resemble the periodic quizzes that most teachers use. Let me clarify the issue of formative evaluations. The need not test only lower levels of the cognitive domain. They need not be done during the class period. They should not reflect negatively on students' grades. They must provide accurate feedback to both the teacher and the student about which objectives have or have not been achieved. The information provided by the formative evaluation is what allows us to begin to individualize instruction in mastery classes.

... Correctives ...

Correctives are specific assignments, tasks, or activities designed to remediate the difficulties revealed by the formative evaluations. Ideally,

these correctives present the material to be learned in a way different from the original classroom presentation. For example, if the formative evaluation reveals that objectives 2, 5, and 8 are not achieved by Student A and objectives 1, 7, and 10 are not achieved by Student B, these two students should have different corrective assignments. Also, because these students mastered different objectives, they should be able to help each other with the objectives they did not master. Many teachers therefore assign each student to a small study group for the purpose of doing homework and correctives. Note how the objectives, formative evaluation and correctives are related. The attainment of each objective is measured by the formative evaluation. Students are then assigned specific correctives to help them master the objectives that they failed to master on the formative. Each corrective should be keyed to a formative evaluation which in turn should be based on a specific objective(s). The corrective phase is the most crucial to the success of Mastery Learning, for it is through the corrective process that Mastery Learning is individualized.

... Summative Evaluations ...

Summative evaluations are designed to evaluate the degree to which the course objectives have been attained. In traditional courses, summative evaluations are used to assign grades and often, if too many students get certain test items correct, thus making the test "too easy," these items are replaced by more difficult ones. To mastery teachers, this is self-defeating behavior. Imagine teachers working hard to perfect class presentations and materials so that students can learn effectively, and then "fixing" exams because students are getting too many correct answers. In Mastery Learning, teachers assume that students will do well on exams, not because the exams are easy, but because the students have mastered the material. Ideally, summative evaluations are conducted at the end of a course. However, as a practical matter, mastery teachers often give two or more 'summative' exams. When this happens in a traditional course, these exam grades are often averaged. A question arises: Why average grades in those courses where the learning is considered cumulative? The following example will illustrate why we think it is wrong to do so. Suppose that a student does poorly on a summative test given after the first six weeks in a course; however, as the course continues he finally clearly understands the concepts covered in the first six weeks and would, if given the opportunity, demonstrate mastery of these concepts. Yet, by averaging his poor sixth week test score with his other scores, we are certifying that he does not understand those concepts as well as he really does. In short, why not give students credit for what they have actually learned by semester's end, instead of by what they have or have not learned at various points along the way?

... Objectives Grading Standards ...

In Mastery Learning, comprehensive exams given at the end of the semester count more than any other exams. By this time most students will have became thoroughly acquainted with mastery methods and they will have demonstrated mastery of the course objectives. At the same time, because no one has perfected the implementation of Mastery Learning, not all students in Mastery classes will receive A's. Nevertheless, it is necessary to establish completely objective grading standards in mastery classes. Because the point of Mastery Learning is for students to demonstrate mastery, grading on the curve is not permitted. We recommend something like the following, especially for teachers who have taught the same course a number of times using traditional grading techniques: first, scrutinize the exams and the grading pattens of these courses. Second, develop an abilities checklist. Third, arrange the abilities on this checklist in order of difficulty. Then let the previously-given grades serve as a guide in determining the cut-off on the abilities checklist.

By utilizing techniques similar to the one above, realistic standards for grades can be developed. Also, by providing the students with such a standards checklist, arguments about grades can be avoided.

... Orientation ...

Because so few of our students are accustomed to achieving high standards of performance, it is of paramount importance that a sufficient amount of time and effort be devoted to explaining the mastery concept and convincing students that it can indeed work for them. By using either a printed brochure or some more informal method teachers must convince students that by reading the objectives, doing the homework, evaluating the feedback provided by formative tests, doing the correctives, demonstrating

competence on retake and formatives and using the abilities checklist as a study guide, they will achieve mastery on the summative exam.

Materials Development Activities

1. formulate general course goals,
2. selection of course topics,
3. division of topics into units,
4. state specific course/unit objec tives,
5. select homework assignments,
6. develop formative evaluations,
7. choose correctives,
8. prepare abilities checklist,
9. develop summative evaluations,
10. set standards of performance and
11. write orientation to Mastery Learning

As the diagram above demonstrates, there are distinct phases in the implementation of Mastery Learning. The most important phase is the first one: orienting students to the mastery strategy. Teachers should be forewarned about the skepticism they will arouse when they try to convince students—many of whom will never have received an "A" grade before—that they are almost assured of getting an A in the course if they follow the procedures. Also, for many, this will be their first encounter with specific instructional objectives, tables of specifications, formative evaluations and small group study sessions. They must be persuaded that these techniques have value and will help them achieve that A grade.

One of the most successful mastery teachers in the City Colleges, and a former director of the Mastery Learning Program, is Professor Jones of Olive-Harvey College. The following is a paper prepared by Jones describing how he orients his students to Mastery Learning:

... Emmett Jones' Orientation ...

It is the first day that sets the tone for the rest of the term. It is the beginning of the instructor's effort to change students' negative attitudes about their learning ability.

On day one of the semester, I give the students an outline of the basic Mastery Learning concepts. I then ask them, "How many of you would like to make an "A" in this class?" Quite naturally everyone's hand goes up. I then say, "You are quite fortunate because every one gets an "A" in this class." I then proceed to tell them about the three views held by teachers regarding student achievement. I tell the students that there are some instructors who think of students as either good or bad, and that this attitude is reflected in the bell shaped curve. I spend 10 to 15 minutes explaining that some instuctors, probably 80 percent, believe that some students are born with a high IQ and high aptitude and that this explains their high educational achievement, while other students have low IQ and low aptitude, which explains their low achievement. Then I go into Carroll's concept of the fast and slow learner and his belief that with time all students can learn. I tell them that Carroll gave us a new definition of aptitude, which he defined as the amount of time it takes a student to complete a given learning task. Students who finish quickly are said to have a high aptitude for that task, and those who finish more slowly are said to have a low aptitude for that task.

... All Students Can Learn ...

My discussion then shifts to Bloom's work and how approximately 15 percent of all teachers have moved toward this view. Dr. Bloom says that we can all accept Carroll's notion that there are only fast and slow students instead of good and bad ones, and that all students can learn with time--but with one problem: time is limited by life. One may not live long enough to complete certain tasks. So Bloom asked, "What can I do to reduce the amount of time it takes to complete a given learning task?" He decided that before he could do that he had to find out what caused the variation in learning time in the first place, that is, the variation in the amount of time it takes to complete a learning task or the letter grade assigned after completing the task. Some students in the classroom may take 10 minutes to complete a given task, while other students may take only five. Some students may make an A and some students B's and some C's and some D's and some F's. So he put graduate students to work to explore what caused this variation.

The first finding was that 50 percent of the variation is due to the prerequisites that a student brings to a course, that is, a student's history or experience with a particular subject area. I tell students that if it were possible for all students to get the same teachers, the same textbooks, and the same instruction, we could reduce the variability by 50 percent. Then the variance in time to master each new learning task could be reduced from 10 minutes to five minutes.

... Work on Positive Affect ...

The second variable, "affective entry characteristics," accounts for another 25 percent. I define affect as the interest of students in a subject, their attitudes towards it, and their concept of their ability to learn it. Our students usually feel that they are going to fail. I let them know that we are going to work on making their "affect" more positive. I use the following illustration to show the interrelation between cognitive entry behavior and affective entry behavior. A child from a very high socio-economic background (the father earns $80,000 annually) has a mother who can stay home and train her preschool child. She buys pencils and crayons and whatever educational materials the child needs.

In another home we have a child from a very low socio-economic background. There is no father in the home, the mother works 10 or 12 hours a day, and there is very little money for educational materials. The two children are enrolled in the same school. On the first day of class, the teacher asks them to take out a sheet of paper and try to write out their name, address and telephone number. The child from the deprived background has likely never heard of an address or telephone number, nor the fact that they can be written. I tell my students that the teacher is likely to say that the child is dumb. But, I explain, intelligence has nothing to do with this child's performance. The child simply does not have adequate cognitive entry behavior. If teachers accepted this fact, they could teach children what they need to know in order to perform these simple tasks.

The point of my illustration is that by the end of the first day at school the stage has been set for the remainder of this child's educational career. From the beginning the child has been branded as dumb by his teacher, his peers, and his parents. By the end of the first year of elementary school, the child is unable to accept anything related to education; a lack of congitive entry behavior has led to negative affect.

... Quality of Instruction ...

The third variable I attempt to explain is "quality of instruction." I tell my students that 25 percent of the variation in classroom performance can be accounted for by the quality of instruction. I make it clear to my students that I have dedicated myself to making sure that everyone in the class understands everything that I have to teach. The point that I am trying to make is that students must understand what is being taught at the time it is being taught. I try to convince them that they will receive excellent instruction in my class.

... Explain Classroom Proceedures ...

After having explained the three variables accounting for the variations normally seen in classroom learning, we then discuss how we are going to proceed. I believe it is important to tell students how the instructional course materials will be organized and presented. I discuss the concept of "sequential teaching units." I tell them that a teaching unit is simply a body of instructional material, such as a chapter in a textbook. A teaching unit is about eight to 10 hours of instruction or about two calendar weeks. Referring to my earlier discussion of cognitive entry behaviors, I explain that, because of their differing backgrounds, students can expect a wide variation in test performance on our first instructional unit. However, because students will take part in correctives after completion of the first unit, they should all be closer in grades in terms of the cognitive entry behavior required for the second unit.

When they take the test for unit two, they should not be surprised to find that a larger proportion of the class has done well. The overall performance of the class will

improve with each succeeding task, while the variation among students decreases. I make it quite clear that they cannot possibly pass unit two unless they have mastered unit one, and they cannot expect to adequately master unit three unless they have learned unit two. After this admonition, I pass out the reading assignment sheets which are organized in a sequentially ordered manner. I let the student know that they don't have to go around guessing what we will do in the course, and I reinforce this statement with a complete set of objectives for the course. Each objective is arranged in teaching unit order. I review the objectives with the students, telling them that they should read the unit's objective(s) after they have completed the unit. If they feel they can do the things stated in the objective, they can rest assured that they have mastered the unit. At this point I inform the students that they will not graded on the curve--they will have to meet predefined standards.

... Realistic Grading Standards ...

Fifteen years ago all our biology teachers came together and analyzed the results of the examinations we had been giving. After this analysis (we established what we thought to be realistic grades for the range of scores) we reviewed our examination. At our school we decided that any student who got 85 percent of the material correct warranted an A, 70 percent translated into a B, 50 percent was a C, 40 percent a D and anything below 40 percent was an F. I strongly recommended that each teacher or group of teachers responsible for the same subject go through the process of setting standards and then using them for grading their summative evaluation.

... Formative Quizzes ...

For me, the most important part of the Mastery strategy is the formative or "diagnostic progress" test. On the first day, I give every student a sample of a formative test. I tell them that if they miss a question they can go home and find the correct answer in their textbook by referring to the page number cited after each question on the test. I also give them a sample answer sheet that consists of two "answer" columns. When they take a formative test, they are to enter their answers in both columns of the answer sheet. After an examination, they are to split the sheet into two halves, submitting one half to me while retaining the other half and the test questions for their own use during the corrective phase.

In the classes I teach, I have divided the subject matter into 10 units, and I have elected to give a summative examination at the end of the fifth and 10th unit. Students are made aware of the fact that the two summative tests are the only ones that count toward their grade--the formatives given after each unit receive no weight in the final grade. It is important to spend the time to reassure the students that the instructional method used is not designed to separate the sheep from the goats; it is to assist them in learning and improving their attitude toward learning. The student must also be convinced that teachers are available to help them in any way possible, that every student is expected to make an A, and that they must begin to cooperate rather than compete. To facilitate cooperation, the students are asked to form small peer study groups and then to exchange telephone numbers and meet at each other's homes prior to the formative and summative exams. I then give my students an idea of what to expect in the day-to-day routine of the classroom.

... Formative Quiz Proceedures ...

If I am orienting a class that meets on Monday, Wednesday and Friday, and if it takes about two weeks to complete a unit, and if unit one is completed on a Wednesday, on that day they will be informed that a formative test will be given on Friday. They will be given a copy of the examination booklet and an answer sheet. They are told that they have 15 minutes to complete the exam. Upon completion of the exam, they are to split the answer sheet in half, give me one half, and retain the other half and the examination book for themselves. I spend some time answering and asking questions and clarifying any points until every question on the exam has been discussed. The students then grade their own papers. Those students who do not achieve 85 percent correct answers are told that they will have to retake a parallel exam on the following Monday. Students who have

achieved mastery (85 percent correct) are told that they can come to class 15 minutes late on that day because the first 15 minutes of the Monday class will be devoted to giving retakes. On that Monday, we do not spend time clarifying concepts, but we examine the correct answers on the retake.

... Certificates of Mastery ...

Our Mastery Learning teachers have prepared special certificates that we distribute to the students who achieve mastery on a unit. Imagine how the students feel when they individually come forward to receive their certificates and the whole class applauds! It is probable that this is the first time that many of them have received any recognition for anything they have done. We have this little ceremony on the first unit only; on subsequent units, I distribute the certificates to the students at their seats. We then spend a few minutes going over the correct answers; we do not spend time discussing concepts or entertaining questions.

... Retakes ...

Another activity we do on the first day of orientation is to clarify the difference between a formative exam and a retake. We explain that, although the two exams are similar in subject matter, they are not identical; therefore, students should not waste their time memorizing the questions on the initial exam hoping they will apear on the retake--they won't. For example, on the initial exam I might ask students for the approximate number of neutrons in atoms having the symbol "Fe," and in the retake I might ask for "Md." I emphasize that it is the concepts they must learn.

... Students Responsible for Learning ...

I would like to say a few words about my teaching style. I always try to emphasize that students are responsible for learning the material. I place the blame squarely on them if they fail to reach mastery after they have been given the correctives and the retake. I make sure that on day one my students understand that my standards are high and rather inflexible. I start my classes promptly on the hour. If a student is late for an exam, no additional time is allotted for completing the test. Absences may not exceed the number of time the class meets in a week (normally two). I only call roll once. If a student arrives after his name is called, he is marked absent. Students who exceed the maximum number of absences are asked to withdraw from the class. I always warn my students that we have severe snow storms in Chicago and if they have already taken their two days off because their toe nail hurts, they better sit on the ground and slide their way to class.

Also, if there are students who have not demonstrated mastery by the end of unit three on at least one of the initial or retake formatives, they are asked to leave. Many of you might find my methods a bit extreme for a college class, but they work for me. I usually start the semester with 30 students in a class; I always end up with at least 28. From my experience, if you provide guidance, students will do what is expected of them.

... Ultimate Result Worth Investment ...

In summary, I have little doubt that those who adopt a Mastery Learning approach to teaching will find the ultimate result well worth the investment. Instructors must be willing to invest much effort in planning and preparing a Mastery Learning course in order to insure that the students have a clear sense of direction throughout the learning experience.

Most teachers who have used mastery techniques would agree with Professor Jones. I have repeatedly heard from teachers how using Mastery Learning has improved the performance of their students. It is important to note that there is not just one way of doing mastery.

Teachers incorporate many variations into their mastery strategies. Some modify the technique to the extent that it is barely recognizable as Mastery Learning. Whatever the modification, the essential feature of Mastery Learning is the individualization that takes place through the formative-test, corrective-retake process. It is at this point where the students deal with the specific ideas, concepts or skills they are finding difficult.

... Mastery Learning Library ...

In our project in the City Colleges, we are beginning to reduce the time required to prepare mastery materials by assembling the materials already prepared in our Mastery Learning Library. Now when a teacher decides to do Mastery Learning he can begin by looking at what other teachers have done and modify these materials to meet his own needs. The time required to modify these materials is considerably less than the time required to develop them from scratch.

We are also beginning to identify other techniques and strategies that work with our students. Hopefully, these techniques and strategies will be transferable.

... Our Challenge ...

We in education must find the ways and the means of getting more of those who come to us to reach a high level of competence. In any case, as has been said so many times before, we can no longer waste so much of our most precious natural resources by letting so many among us go underdeveloped. More of our students must learn more of what we have to teach. We must find the ways of teaching more effectively and more efficiently.

MASTERY LEARNING: PAST AND FUTURE DIRECTIONS

KEYNOTE ADDRESS

BY

THOMAS R. GUSKEY

DIRECTOR OF RESEARCH

THE CENTER OF TEACHING AND LEARNING

CITY COLLEGES OF CHICAGO

This evening I would like to share with you some of my own perspectives on Mastery Learning. First, very briefly, I would like to reflect upon how Mastery Learning began and upon the ideas which stimulated its development. Then I would like to describe what I see as the present status of Mastery Learning, both in terms of Mastery Learning research and in the application of its principal instructional strategies. Finally, I would like to propose some future directions for us in Mastery Learning—directions which I believe hold promise for all of us who are deeply concerned with the improvement of teaching and learning.

... The Development of Mastery Learning ...

During the 1960's a wide range of demands was made of nearly every organized institution in our society, and certainly education was no exception. Of all the demands made of education during this time, none was louder or more pervasive than the demand for greater individualization of instruction. There was growing pressure to provide greater flexibility and more freedom throughout the entire educational process. Educators, in turn, began to see merit in many of these demands, for teaching and instructional techniques had traditionally been teacher-centered and rather inflexible, perhaps even restrictive for many students.

So educators began to focus their attention on ways to better individualize instruction. "Continuous progress" programs sprang up across the country; programs in which students progressed through the curriculum at their own pace. "Open education" programs were also begun to allow students greater freedom and flexibility in their learning activities. But with these new, more individualized approaches came a number of serious problems. Classroom management became more difficult. Organizing individualized programs for each student or even small groups of students presented tremendous problems for the majority of teachers who were unprepared for these responsibilities. The record-keeping alone was an awesome task. In addition, there was the ever-present administrative demand that a certain amount of content be covered within the limited amount of classroom time available.

... Benjamin Bloom's Research ...

At the same time, Professor Benjamin S. Bloom of the University of Chicago was struggling with a related and very perplexing question: Under what conditions do students learn best in the classroom? In other words, what is known about teaching and learning that can be used to help teachers improve classroom instruction and hence, student learning? To answer this question, Bloom drew upon two different areas of research. The first concerned what happens in an ideal instructional situation where a trained tutor is paired with each student. The second dealt with what academically successful students do in the classroom that academically unsuccessful students do not do.

... Feedback and Correctives ...

Bloom noted that when a good tutor works with a student, that tutor regularly checks on the students's learning progress. In making these checks, the tutor solicits feedback from the student to make sure that no errors have been made in the learning. The tutor also continually reminds the student about what is most important to learn. If the student makes an error, the tutor tries to explain the problematic idea or concept in a different and hopefully more appropriate way. The tutor then checks the student again for mastery before moving on.

The use of this feedback and corrective process is not only present in the ideal tutor-student interaction, it is also what academically successful students seem to be able to do for themselves. These students use marked papers and quizzes from the teacher to correct their learning errors and direct their further study in remediating these learning difficulties.

The instructional procedures Bloom outlined to include this feedback and corrective process he labeled "Learning for Mastery". Through the organized use of these procedures, Bloom felt that as many as 80 percent of the students in a class could attain a level of achievement reached by only 20 percent of the students under more traditional instructional methods. With a paper he published describing these procedures in 1968, the Mastery Learning Movement was born.

... Early Research in Mastery Learning ...

The early research on Mastery Learning consisted mostly of small studies on the application of these procedures in short courses, generally at the high school or college level. One of the very first attempts to implement Mastery Learning on a continuing basis, that is, over an entire academic semester or year, took place here in the City Colleges of Chicago during the early 70's. All of these efforts proved to be very successful. Although few classes reached the theoretical success rate of 80 percent, all of the mastery-taught classes showed dramatic improvement in a variety of educational outcomes.

... Present Status of Mastery Learning ...

Since those initial efforts in the early 70's, Mastery Learning has come a long way. Today Mastery Learning programs are well established in colleges and universities across the country. Mastery Learning is also used in a wide variety of business, military, and professional training programs. Furthermore, programs incorporating Mastery Learning are being implemented in nearly every large urban school system in the United States - in New York City, Philadelphia, Chicago, Denver, and Dallas, to name just a few. In these programs Mastery Learning strategies are being applied in kindergarten through twelfth grade, in subjects ranging from basic skills to advanced courses in calculus and physics.

As a result of the growing popularity of Mastery Learning, several problems have arisen. One of these problems is that the term "Mastery Learning" has become very much a "buzz" word, and is now being attached to many materials and programs that actually have very little to do with the philosophy, theory or practice of Mastery Learning.

Another pressing and much more serious problem concerns the growing conflicts arising among Mastery Learning advocates.

... Different Approaches to Pacing Instruction ...

The first of these conflicts concerns the pacing of instruction. One side in this conflict supports an individually studentpaced model of Mastery Learning, similar to that suggested by Keller in 1968. Under this model, feedback and correctives are provided to students as they progress at their own, individually determined pace through a course of instruction. The other side of this conflict supports a group-based, teacher-paced model of Mastery Learning, similar to that suggested by Bloom in 1968. This model suggests that while the feedback and correctives must be individualized, the pace of instruction in the course is best determined by the teacher, particularly under the conditions and constraints of the classroom environment.

Both sides of this conflict have spent a great deal of time and energy trying to demonstrate that one model is better than the other. The research seems to indicate that in most classroom situations, a teacher-paced model yields somewhat better results. However, it is my firm belief that there is no one best way to conduct Mastery Learning. One of the most positive aspects to Mastery Learning is its flexibility. The basic elements of Mastery Learning can and need to be adapted to each particular instructional situation. What works best in one situation may not work best in another. Both of these methods of instructional pacing have their merits. In applying Mastery Learning we must be sensitive to the demands and the constraints of the teaching situation so that we can make wise decisions about the kind of instructional pacing that will be most appropriate under those conditions.

... Different Methods of Implementation ...

A second area of conflict is how Mastery Learning can best be implemented. Again, two different positions have developed. One side advocates what I have labeled a curriculum-materials approach to implementation. Under this approach, a team of curriculum specialists, writers, and Mastery Learning experts work together to develop materials which are then distributed to teachers so they can adapt their instruction to a Mastery Learning format. Often such materials become part of a school system's established curriculum or may even represent a complete instructional package. Educators supporting this approach generally feel that teachers do not have the skills necessary to develop these materials, nor do they have the time.

Others, however, advocate what I have labeled a teacher-development approach to implementation. In this approach, teachers are first trained in the theory and techniques of Mastery Learning and then, individually or in small groups, develop mastery materials for use in their classrooms. Those supporting this approach feel that teachers need to be personally involved in the development of materials. Such involvement not only allows for individual adaptation, but also for a greater sense of personal participation, a key element in the success of any innovative program.

Although a great deal of time and energy is being spent in this conflict, especially now that Mastery Learning materials are being promoted and sold by a number of individuals and companies, research indicates that both approaches have their advantages and disadvantages. Certainly large scale implementation can be achieved at a much faster rate through the curriculum materials approach, but we also find that the teachers and instructors involved in this approach tend to be very dependent upon the materials and generally lack the ability to expand their application of these strategies. The teacher-development approach, on the other hand, is much slower to implement. However, we find that teachers and instructors exhibit greater flexibility and confidence in utilizing Mastery Learning under this approach and also are much more likely to expand their application of the strategies.

... Many Ways to Implement Mastery Learning ...

But just as I believe there is no one best way to conduct Mastery Learning, I also believe there is no one best way to implement Mastery Learning. A particular instructional situation may make one or the other of these approaches inappropriate or even impossible. In other cases, it may be possible to take advantage of the positive elements of each of these approaches. In the New York City public schools, for example, excellent progress is being made in combining these two approaches. The materials prepared by one group of teachers is passed on to other teachers so that they might revise, alter, and make additions as they see fit. This allows each teacher to maintain a sense of personal participation while dramatically reducing the amount of work each is required to do.

In focusing upon these conflicts and differences, we do not want to lose track of our common directions and goals. The question Bloom struggled with fifteen years ago is still with us today: Under what conditions do students learn best? Mastery Learning has taken us many steps toward answering that question, but many steps remain to be taken.

... Future Directions for Mastery Learning ...

We know that Mastery Learning works and that it works very well. The evidence of this lies not only in Mastery Learning research, but also in research on general instructional effectiveness, which in identifying effective teaching practices has listed many elements that strongly resemble Mastery Learning. Still, there is a great deal that remains to be done. For instance, we know that it is important to give students regular feedback on their learning progress, but are there ways to provide this feedback more quickly or more efficiently? How often is this feedback necessary? Can feedback be provided to students through a variety of formats? Under what conditions can students gain feedback on their own?

Similarly, we know that teachers have found that the use of structured correctives and the entire corrective process is vital to effective teaching. But how simple or complex must these

correctives be? Can correctives be handled more efficiently? Can students be helped to structure their own corrective activities?

... Further Research Needed ...

In addition, many questions need to be answered about the broad based application of Mastery Learning. What would happen if all of a student's classes were Mastery Learning classes, rather than just one or two? What if students were taught entirely by Mastery Learning procedures during the first three grades in school or during the first year of college? Also, how can Mastery Learning be better used to help students become more effective learners? Can students be taught to provide the elements of Mastery Learning for themselves in the absence of a formal structure? Can Mastery Learning be used as a vehicle to teach students learning skills? What are the possible long-term effects of Mastery Learning?

This is undoubtedly one of the most exciting and promising areas of research in education today. I hope that this conference serves to stimulate your interest and excitement in these ideas. I also hope you will continue to be involved in this work and will join with us in our efforts in the Center for the Improvement of Teaching and Learning. Many challenges lie before us, but so do many rewards.

MASTERY LEARNING IN VOCATIONAL EDUCATION

BY
BRUCE MCDONALD
CURRICULUM MATERIALS DEVELOPER
ASSISTANT PROFESSOR FOR VOCATIONAL EDUCATIONAL STUDIES
SOUTHERN ILLINOIS UNIVERSITY

During the past two days, you have heard how Mastery Learning is used in "academic education." In the next hour or so, I will discuss how Mastery Learning can also be applied to vocational education. It is important to note at the start that the principles of Mastery Learning can be applied to either type of education; only the procedures differ, and they only differ in the beginning and the end of the processes.

We should first distinguish between two types of education. In a community college, vocational education is concerned with preparing people for specific occupations. Another feature of vocational education is that the educational programs are terminal, rather than transfer, and enrollees do not usually plan to go into a baccalaureate degree program. On the other hand, academic education is concerned with the skills and the knowledge appropriate to an educated citizenry. And, community college students enrolled in academic programs often plan to enroll in a four-year college. The basic difference, then, between the two types of educational programs is that vocational education is concerned with job preparation while academic education is not.

... Essential Mastery Learning Components ...

I will ask you to refer to the events mentioned in your handout, so that you can follow the evolution of Mastery Learning in vocational education. Five essential components - task analysis, behavioral objectives, criterion evaluation, taxonomies of learning, and the systems approach to course development listed on the bottom of your handout - were invented, refined, and then used over the past eighty years. The current state-of-the-art in vocational education curriculum development requires the use of those five components. You will notice that the handout lists both civilian and military contributions. I will describe the events as they occurred. You will find that vocational education began with the process of learning the steps necessary to Mastery Learning earlier than did academic education.

... Mastery Learning in the Military ...

As shown at the top of the right column there were very few formal schools in the military at the turn of the century, and those were only for officer training. Enlisted men received on-the-job training. The military used a very practical form of Mastery Learning then. If a recruit was to learn to ride a horse, he rode, fell off, got up and rode again until he became proficient. He shot a rifle until he hit the target every time. True Mastery Learning procedures were used: objectives were clear and the evaluation process was criterion referenced. Everyone learned along with everyone else, and those who couldn't do something right the first time kept trying until they did.

... Civilian Contribution ...

Now, look to the left to the civilian contribution column,. In the public schools (there were no schools comparable to the community college), education was also based on Mastery Learning principles. In the one-room schoolhouse and in larger city schools, students were expected to learn the material well, and they didn't go on to new material until they had completed their assignments to their teacher's satisfaction.

... Carnegie Units Introduced ...

But, enormous changes were taking place in America as the industrial revolution continued. Immigrants from Europe entered the labor force in great numbers. As they followed jobs from city to city across the country, their children needed to document their English and other academic skills. Thus, a system of documenting student achievement needed to be developed. The Carnegie Foundation paid for such a study, and out of this study grew the idea of school credits — basically the same system we now use in all of our public schools — so that students can move freely from one school to another. This new system kept records of how much time a student spent learning certain kinds of material. We now call this time semester, quarter, or credit hours.

The Evolution of Mastery Learning in Vocational Education

Period	Civilian Contributions	Military Contributions
1900-20	"Carnegie Unit" was devised to standardize course credits between schools	Few formal schools, OJT was the basis of technical training
	Industrial psychology and time and motion studies	"Alpha" test developed to select for training and jobs
1934-39	Dictionary of Occupational Titles--job analysis	
1940-45	DOT supplements and training assignments	Aptitude testing for job
	Course design based on job analysis	DOT-based job descriptions
1945-55	GI Bill for veterans--and problems with college entry	
1956	Cognitive taxonomy devised to develop entry tests of college-level abilities	Norm-based testing from aptitude tests used for technical course completion
1958-60	National Defense Education Act (NDEA) in reaction to Sputnik--teaching machines and programmed instruction	Management systems to develop complex weapon systems--flowcharts, feedback loop
		USAF's ATC proficiency code
1960-65	Mager devised format for behavioral objectives: (conditions, behavior, standards)	ATC Programmed Instruction Writers Course devised behavioral objectives
	Krathwohl's Affective Taxonomy	
1965-70	Gagne devised "types of learning" taxonomy to develop courses	ATC developed Instructional System Development using task analysis, proficiency code, behavioral objectives, and system with feedback
	Vocational educators begin conducting task analyses for service areas	
1970-78	Competency-based instruction adopted by business, industry and education--using ISD principles and procedures, national consortiums formed	AFM 50-2, Instructional System Development, for all Air Force education and training
1978	Illinois joins V-TECS, adopts ISD in program development	All military services develop programs using ISD, taxonomies, mastery learning principles and procedures

The five components of modern course design requiring mastery learning are:

1. task analysis so that valid objectives and tests are possible.
2. instructional objectives (conditions, behavior, standards).
3. criterion evaluation based on valid objectives.
4. taxonomies which identify types and levels of behavior.
5. systems which incorporate the above and which use feedback to improve the course.

... Grades introduced ...

The system was so popular that it quickly swept the country and became the standard way of recording student progress. There was only one flaw — the system didn't take into account how well a student did. Soon after the Carnegie unit was established, educators began to supplement the system with something called grades — A, B, C, D, and F. The grade system enabled teachers to communicate to one another as well as to parents and students how well the students did while they were enrolled in a unit of instruction for a certain period of time. It is important to point out that in the beginning the grade system worked very well because standards were clearly established. In fact, it might be said that grading systems worked well until about the mid-sixties, at which time they stopped being effective.

... The Invention of Task Analysis ...

Look now at the industrial psychology and time and motion studies. Again because of the industrial revolution, immigrants were being put to work on assembly lines. European farmers, craftsmen, and others were being asked to work at the pace of a machine. To get the most production out of the workers, managers hired people to develop the most efficient ways for certain kinds of work to be done. These people developed time and motion studies. It is often thought that this was the beginning of what is known as industrial psychology. For our purposes, the most important thing that happened was that a group of people became experts in observing workers on the job, and they wrote down the tasks performed and organized them on paper; in short, they invented something called "task analysis." This led to the development of task analysis personnel, which led in turn to the beginning of the task analysis process, which has since grown in importance and sophistication. Today, task analysis is the keystone of Mastery Learning in vocational education.

... Development of the Alpha Test ...

During World War I, thousands of farmers, immigrants, and others joined the Army and the Navy. Hundreds of thousands had to be recruited and trained in new occupations. Since it was essential for the American Army and Navy to make the best use of those people who could read and write, the first written test of aptitudes, the Alpha Test, was developed. The Alpha Test helped to select recruits for training in specific jobs. As it developed it was not so much an aptitude test as it was an ability test, but the important thing here is that for the first time a standardized test of vocational aptitudes and abilities was administered to large groups of people.

... Dictionary of Occupational Titles ...

In the Thirties during the Depression, Congress passed The Wagner-Pizer Act, which established a Federal-State Employment System. The government also began an occupational research program to develop a "dictionary" of occupational titles which would standardize the different job descriptions. The dictionary was published in 1930, and it described over 17,500 different jobs. These jobs were categorized into 550 occupational groups and were labeled "skilled, semi-skilled, and unskilled." This massive effort was possible only because people were available who could do task analysis. The Dictionary of Occupational Titles not only identified the job titles, it also listed the major types of work done in each job. The Second World War saw the increase of many new occupations as radar, sonar, jet aircraft, and other new military technologies were developed. In the civilian world, too, many techniques and processes were developed in the factories to support the war effort; thus the government developed a supplement to the Dictionary of Occupational Titles to reflect the increase in occupations.

... Aptitude Tests ...

During World War I the Alpha Test was used to determine the basic aptitudes and abilities of the new recruits, mostly by testing mathematics and reading skills and general academic knowledge. During World War II, achievement and aptitude tests were much refined. Tests were developed to determine whether a recruit should be sent to flying, maintenance, typing, or baker's training. The normal curve — the bell-shaped curve - determined virtually all job and training assignments. If a recruit took a test and ended up in the bottom third of the normal curve, there probably was little sense in training him, because he wouldn't be as effective as those in the middle or the upper end of the curve. The key factor here was that military psychologists gained a great deal of experience in aptitude testing, in the assignment of recruits to training schools, and in measuring expectations of success or failure in a given occupation. It may be of interest to those of you in vacational education to note that the most common system for developing vocational courses was developed during 1943, along with the first text book that described how to develop courses using a systematic approach.

... Attempts to Predict Academic Success ...

After World War II a couple of million ex-GI's were told that they could go to college. Before World War II only a select few could go to college. Basically, people went to college if their fathers were in one of the professions. The average middle-class citizen's son did not go to college.

Before World War II, when all college freshmen had just graduated from high school, prerequisite examinations pretty well sorted out those who had learned the high school material and those who had not. Now the same test was being given to veterans who had not been in high school for five or six years, and they failed. And yet, many of those who failed the pre-requisite tests went on to become engineers, doctors, and lawyers. It was clear that these tests did not predict academic success. Educational psychologists and administrators were concerned, and in 1948 they formed a group to come up with some answers. Dr. Benjamin Bloom of the University of Chicago was a leader in this effort.

After the Korean conflict several hundred thousand Korean veterans hit the college campuses, failed the prerequisite tests, and went on and did well. Again, the tests did not predict their academic success.

... Test Emphasis Wrong ...

In 1956, the Taxonomy of Education Objectives, Handbook I, The Cognitive Domain, was published. Benjamin Bloom was the editor, and he was assisted by several other noteworthy educational psychologists. They reported to the educational community that, in fact, educators had been testing the wrong thing in the college entrance examinations. They identified six levels of thinking in the learning process. The lowest level, knowledge, deals with memorizing data and facts and concepts and procedures, and this was the level that was tested in the high school finals and college entrance examinations. However, memorization is not what college students are expected to do; they are supposed to reason and solve problems.

... Bloom's Taxonomy ...

Handbook I does two things. It describes the six categories so they can be interpreted, and it gives a number of sample test questions at each of the levels. As a result, test writers were able to develop valid tests which could accurately predict success in academic courses. The two most-used tests are the SAT and the ACT. For the first time educators had a way of determining what level of thinking was to be learned at a given point in a curriculum.

... Student Affect Affects Learning ...

Bloom and his colleagues reported that they had discovered something else: what a student was able to do was only part of the story; what he was willing to do was even more important. Eight years after the publication of Handbook I, the Cognitive Taxonomy, several members of the initial team and others — Krathwohl was the editor — finished Handbook II, The Affective Domain. These two handbooks, many think, were the most important developments in education in that decade.

... The Normal Curve ...

Then came a problem for the military. Norm-based testing, developed to determine aptitudes, began to be used in technical courses as well. The services employed a number of psychologists who had worked with the normal curve and had worked up predictive instruments for many courses. They now looked for new worlds to conquer. They showed trainers that the normal curve could describe the graduates of any course.

Shortly, military courses began to use t-scores and z-scores and other means of describing normal populations to justify why some students didn't learn as fast as others. Accordingly the military developed a standardized system of "washing back," of having people repeat a unit of instruction. The flaw in the system, of course, was that since the students had passed aptitude tests to get into a course, it was extremely likely that the students could learn the material. In fact, using the new system, 15% of all the instructors who taught the course would have to repeat the course because their grades would be lower than the other 85%. Students who washed back more than twice were regarded as failures and were transferred to jobs more in keeping with their abilities, and in this way the ranks of the military police, the cook schools, driver's training, etc., were kept full.

... Washing Back Inefficient ...

Every time someone complained about the inefficiency of this system, the psychologists would point to the normal curve and say it was natural that people would be washed back if they hadn't learned the material. They would simply have to do better the next time. Perhaps the psychologists thought they were describing a kind of mastery learning, but it didn't work that way, for those who were being washed back thought of repeating the course as punishment; their morale went down and they quit learning. It would be at least ten years before that obvious flaw would become apparent. The question is, if all who enter a course have the aptitude, why should any fail? Some should simply take longer than others. But at that time, the psychologists were making the decisions.

... Sputnik Spurs Science Education ...

In 1958 Russia scared the U. S. by putting Sputnik into orbit. Americans reacted violently. It was quickly apparent that we were misusing our most important national treasure, our youth. More people had to go into the sciences. Since we couldn't quickly retrain our teachers, technology would do the trick.

... Teaching Machines Unusable ...

The National Defense Education Act dumped federal dollars into school systems and academic programs. Teaching machines, using linear programmed instruction, were bought by the thousands. They didn't work, of course. After the schools bought the machines and the sample programs and then asked for more materials, they were told that none were available. It seemed that there simply weren't any trained program writers available, particularly in the scientific areas. Within a year, the machines were relegated to the basement or the store room, where they were forgotten.

The military was also involved in buying new technology. They were developing and placing inter-continental ballistic missiles around the country. These complex weapons systems required thousands of sub-contractors, millions of parts, and highly developed management systems to keep track of everything and to make sure that all the parts came together at the right time So, the military began using flow charts, PERT, and computers to help make decisions. Essentially what happened was that engineering and management got together and developed today's modern information processing and planning systems. It should be noted at the same time, however, that the military training commands were not doing so well. For example, it wasn't until after the Atlas missile had been retired from the service that a training device, or simulator, was delivered to the Air Training Command, which had not yet developed a system for long-range planning.

Note the reference on the chart to the U.S.A.F.'s ATC proficiency code. The Air Training Command, ATC, developed a proficiency code concurrently with Bloom's Cognitive Taxonomy. The proficiency code was really three taxonomies, each of which had four levels, each one of which described at a given point in time how well a student could perform or understand a given subject or task. It was a highly sophisticated taxonomy, and it is still in use.

... Mager's Preparing Instructional Objectives ...

In the late 1950's, Robert Mager's book Writing Programmed Instruction appeared. It sold well because many people were now interested in learning how to write the kind of programmed instruction that the teaching machines had required. In 1962, Robert Mager re-wrote his book and called it Preparing Instructional Objectives. It was certainly the most important educational text published during the sixties, primarily because he had designed a new way of writing educational objectives. This book is so important that it is now, twenty years later, still being used by every single teacher preparation program in the country.

... Uniform Instruction Needed ...

At Lackland Air Force base in 1961, the military put together an Air Training Command programmed instruction writer's course. In the civilian world, programmed instruction didn't get used very much. Every school district would pick out its own instructional materials, and books didn't cost very much whereas programmed instruction did. (For example, it takes experts about 100 hours to develop a single hour of programmed instruction.) Thus, even though not many school districts were interested in buying new programmed instruction, that was not true for the military service. The Air Force had an unusual problem: one hundred thousand Air Force recruits received basic training at Lackland Air Force Base in San Antonio every year, and every one of them had to take the same instruction. So the Air Force decided to use programmed instruction.

... Programmed Instruction Writer's Course ...

When the Air Training Command programmed instruction writer's course was assembled, sergeants who were very good instructors were recruited for the staff and were taught how to write programmed instructions. They then developed some of the first programmed instruction used by the military, and they began to train other writers. Yet it is so difficult to write programmed instruction that one of the first things a programmer has to ask is "What do the students already know?" The second question a programmer must ask is "What must the students be able to do when they finish?" The third question is "What are the conditions under which they will display what they are able to do?" And last, "How good do they have to be in order to complete the unit of instruction?" The last three questions, of course - which can be condensed into "What are the conditions, behavior, and standards required of the student at the completion of the learning process?" - are relevant in any instructional situation. These are exactly the same questions -- the same parts of the behavioral objectives -- that Mager had come up with.

In 1964, eight years after the publication of the Cognitive Taxonomy, Krathwohl's Handbook II, Affective Taxonomy, was published. This blue booklet refers briefly to the cognitive taxonomy, but instead of being concerned with what a student was able to do, it is concerned with what the student was willing to do. It dealt with the attitudes, motivation, and values of students. It also helped vocational educators look at how to get students to pay attention in class, to think about their education, and to agree with the processes, the safety procedures, and the work values being taught.

... Gagne's Taxonomy ...

In 1965 Robert Gagne of Florida State University developed a "types of learning" taxonomy designed to develop courses. The big difference between Gagne's and Bloom's taxonomies is that Bloom's taxonomy describes six levels of thinking for the purpose of developing evaluation instruments. Also, because Bloom focuses on the testing of these levels, his taxonomy describes in detail the different kinds of thinking involved. On the other hand, Robert Gagne's system describes the learning process, not the testing process. He breaks out the levels in a different way, especially within what Bloom calls "the knowledge level" — that is, the memorization process.

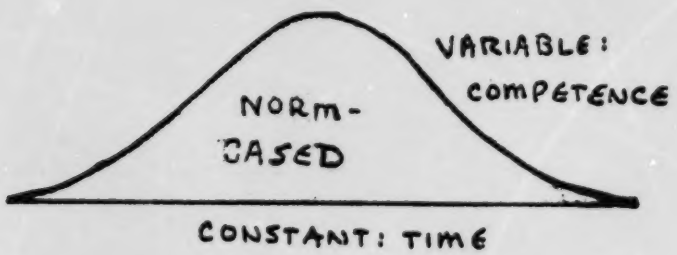
... Normal Curve Debunked ...

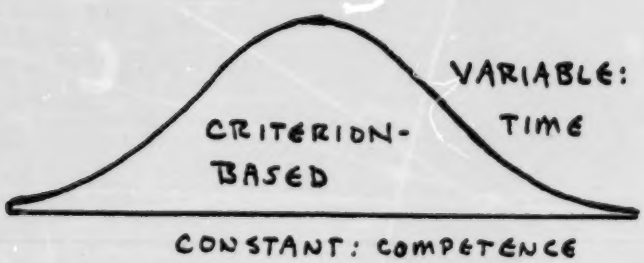
In the military, the Air Training Command programmed instruction writer's course created a group of instructors who learned to ask, "What are the conditions, the behavior, and the standards required for people at the end of a course?" These instructors, reassigned to regular courses, ran into a system where all of the students went through courses at the same rate, and those who were tested at the lower end of the normal curve were described as not adequate and were sent

Comparison of the Taxonomy of Bloom and Gagne

TYPES OF THINKING	BLOOM'S TAXONOMY	GAGNE'S TAXONOMY
PROBLEM SOLVING	EVALUATION SYNTHESIS ANALYSIS APPLICATION	PROBLEM SOLVING
REASONING	COMPREHENSION	RULE USING CLASSIFYING
REMEMBERING	KNOWLEDGE	DISCRIMINATING CHAINING ← MOTOR VERBAL ASSOCIATING

back to take more instruction. The instructors who had been programmed instruction writers said, "This is ridiculous. Don't you understand that different students learn at different rates, that just because a student takes longer, it doesn't mean that he learns less? Don't you understand that students learn differently? Don't you understand that if you tell students the behavior they should display, how well they should be able to do it, and the conditions under which they would display the learned behavior, that they will do well?" They pointed out the flaw in the psychologists' thinking. They pointed out that if a group of psychologists took a course in which 15% were guaranteed to be washed back, then 15% would in fact be washed back even though they knew the material well.





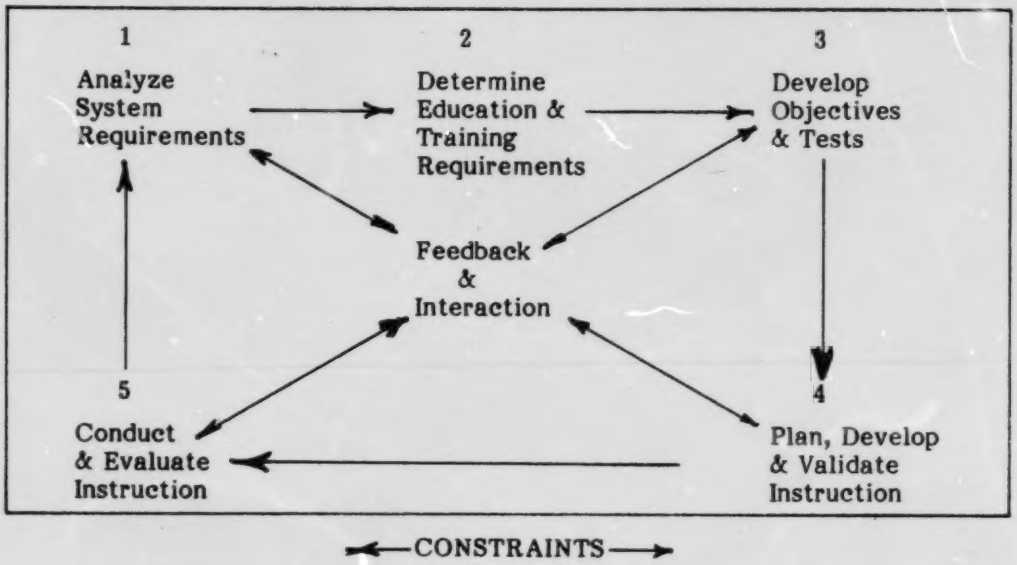
... Behavioral Objectives Adopted ...

Within two years, the idea of behavioral objectives swept the Air Force's Air Training Command. The leaders recognized what a massive and significant change this could make on instruction. Behavioral objectives were quickly adopted and eventually they were used successfully. The problem was that when the curriculum writers were told that they were to use behavioral verbs instead of such vague terms as "know," "understand," and "appreciate," they simply took all the course documents, crossed out "know," "understand," and "be familiar with," and substituted words like "describe," "identify," and explain;" they then had the documents retyped and claimed that they were complying with the directives.

... Instructional System Development Created ...

About this time the Air Training Command created "instructional system development." Although task analysis had been developed initially by civilians and then had been incorporated by the military, the military could use task analysis much more easily because it had a limited number of occupations to deal with. The military had also developed proficiency codes (like taxonomies), behavioral objectives, and criterion evaluation. Finally, the instructional system development process was developed. It included the use of task analysis and the proficiency code, behavioral objectives, criterion evaluation, and a flow-charts system with feedback. The system is much like that used by the managers of weapon systems development teams.

AIR FORCE I.S.D. MODEL



... System Improves Teaching Efficiency ...

In the middle Sixties a team of civil service curriculum writers and sergeants in the USAF Air Training Command met at Chanute Air Force Base in Illinois to develop a regulation for the Air Training Command which would describe how to use instructional system development. This new modern management process would encourage the most efficient kinds of instruction. After developing the manual, team members began testing it. They asked a sergeant who was teaching a twelve-week long course if they could redesign his course using their new modern system. They began with a task analysis, which would describe exactly what the graduates would be abe to do when they got on the job. Then, using the proficiency code, the Air Force's cognitive taxonomy, they described how well the graduates should know the material. Using the Mager format of behavioral objectives, they described what the students should be able to do, the conditions under which they would demonstrate proficiency, and how well they should be able to perform. They developed criterion test instruments for both summative and formative evaluation. Lastly, they put the program together using the instructional system development process. Committee members then went to the sergeant and said, "Sergeant, it takes you twelve weeks to teach this, and we find that we can teach this in only seven. Why do you take so much longer?" The sergeant replied, "Several years back when I was asked to develop this course, I said, 'Yes,' and the next question they asked was, 'How long do you think it will take?' and I said, 'About twelve weeks.' I filled up the extra time with helpful hints and war stories."

One of the purposes of instructional system development is to eliminate the "nice-to-know" and replace it with the "have-to-know." Consequently, what the military had developed was a more efficient system. It used a taxonomy, Mager-type objectives, and criterion evaluation and was based on a task analysis. In other words, it was competency-based instruction, or Mastery Learning. The constant factor in competency-based instruction is, of course, how well students must perform order to complete a course. The main variable is time — that is, different students take different amounts of time to master objectives.

... Variable-Length Course Introduced ...

Instructional system development — Mastery Learning — was first used in electronics training for Air Force officers. The basic electronics course was running about 51 weeks in length — 51 weeks regardless of what your background was — so that even a new Air Force second lieutenant with a Master's degree in electrical engineering took 51 weeks. A young fellow with an aptitude to learn, but with no electronics background, also took 51 weeks. Because it could save so much money, the Air Force modified the course and developed one based on Mastery Learning principles, and using behavioral objectives —a course which some students could finish in as little as four months, whereas others might take as long as sixteen months to complete.

... Labor Department Uses Similar System ...

In the late 1960's and the early 1970's, vocational educators began conducting task analysis for service areas: for home economics, trade and industry, health occupations, and particularly for business and office and distributive education. The leadership for this effort was mostly centered at universities and funds came from the federal government. While most of the instructional system development was taking place in the Air Force and later in the Navy, some systems were also being developed in the Labor Department. Indeed, some of the most sophisticated systems developed during this period of time, especially those combining the cognitive taxonomy and Mager's objectives, were developed for the Job Corps.

... Industry Adopts Mastery Learning ...

The Air Training Command had such great success using instructional system development, behavioral objectives, and task analysis that the entire Air Force was required to start using these methods in 1970 with the publication of Air Force Manual 50-2. Imagine what happened. For several years the Air Training Command had trained its technical instructors to write behavioral objectives, to use a taxonomy, to use a systems approach for designing courses, and to use criterion evaluation. These instructors would then leave the service to begin another career. Some of them went into education, some at the community college level. Others went into

business and industry. Also, the corporations that dealt with the Air Force in the development and maintenance of expensive weapon systems recognized that it was to their advantage to save a dollar. They saw that instructional system development was a very cost-efficient way to design instruction. General Motors, for example, had its own university. Singer Corporation, General Electric, and many others had large in-house training programs. It was to their advantage to move to Mastery Learning, or competency-based instruction, as soon as possible. And move they did, to the point where there are now few, if any, major corporations that do not use the instructional system development procedures and principles in their in-house education and training efforts.

Across the country people recognized that the technology of occupations was changing so fast that it was imperative to stay up-to-date. Because so many occupations were changing so quickly, vocational education required new task analyses just to identify the tools, materials, and processes that graduates would need to know about in order to be prepared for the changing job market. Illinois, for example, now belongs to a national consortium of states that have joined together to develop curriculum materials and to avoid duplicating each other's efforts.

... V-TECS ...

Illinois joined this consortium, called V-TECS, or the Vocational-Technical Education Consortium of States, in 1977. In short, V-TECS came into existence because of the military. Military instructors of electronics, for example, train people for a very specific job. They use criterion evaluations, behavioral objectives, and a taxonomy, and they know exactly the level and the kind of thinking, as well as the kinds of abilities, that the people are supposed to have to do the job. The instructors know how well students can do the job when they graduate from a training program. And these instructors have a task analysis on every single job in the Air Force. Each operation, each bit of knowledge, each tool which must be used and mastered by a graduate in a given course has been identified. Also, here were instructors who, when they got out of the service, might work in a community college.

... Determining What to Teach ...

Normally, when new community college instructors get jobs, they have a number of personal/social things to take care of before they can be effective. They want to know where their desk is, where their room is, where the coffee is, how much they will get paid, and then inevitably they will ask, "What book do I use?" The ex-military instructor, however, might not ask that question. Since he was used to training people for specific jobs, he would be concerned with exactly what they had to know to be effective at their jobs, and he was used to using follow-up studies to find out whether his graduates, in fact, were adequately prepared for their jobs. So when an ex-military instructor went to work for a community college, instead of asking "What book do I use?," he would ask a totally new question: "What must my students be able to do to get a job?" His supervisor would say "I don't know." This hypothetical instructor replied, "Well, I'll find out." He went downtown and asked employers, "What do you want people to be able to do?" They replied that no instructor had ever asked that question before and that they didn't know. So the instructor got from the Air Force a task analysis which described what graduates of certain courses should be able to do. He said, to the employer, "Look at this, please. And look at each one of the skills that students must master, and let's break these skills into four levels. Let's put down an 'A' by those skills that you say are absolutely critical. Let's put a 'B' down if a skill is a 'nice-to-know' but not critical. Let's put a 'C' down by a skill that you would rather we didn't teach because you don't use the equipment, or you use it differently, or you'd rather do the instruction yourself. Finally, let's put a 'D' down if you don't use the equipment and the skill is irrelevant to the job in question."

The instructor then went back and designed a course that would teach those skills that were regarded by the employers as absolutely critical. In fact, the teaching of these skills became the core of the course. In addition, when he had time, he taught the 'B' skills, that is, the 'nice-to-know' skills. The instructor then began to teach the course. His graduates went out, got jobs, and they were superbly qualified in comparison to other graduates. According to employers, previous graduates had learned too much about unimportant things and not enough about the critical ones. The instructor thus became known as an excellent instructor. His supervisors said, "How did you do that? That's wonderful. Could

you do it for another course?" And the instructor's answer was, "No. It was very difficult for me to do, and it took a full year. I no longer have the time, and I have a wife and family. Unless you're willing to pay me a good bit more money, I'm not interested."

... Task Too Large for Individual States ...

In the 1970's the idea that a specific course could be designed for local employers was new, but soon the word spread among different schools within a state that this was the best way to design courses. The technology was there — people knew how to do it, but they found that they were duplicating each other's efforts. Many instructors were working on electronics or engineering courses, but nobody was working on some of the other vocational disciplines. The schools within a state naturally got together and said, "Let's form a consortium — let's hire somebody to redesign our courses at the state level." They tried that and it didn't work so well. The person in charge quickly turned into a bureaucrat. What he or she essentially decided was that it would take a couple of years and a number of people to do a task analysis of an entire state and to write the necessary objectives and the criterion instruments. Essentially, a state could do maybe one or two projects a year — if it would hire a lot of people. So, the state wasn't getting very much of the job done, especially since a lot of occupations had to be addressed.

... How Consortium Works ...

In 1973 the Vocational-Technical Education Consortium of States, V-Tecs, was formed. It was

VOCATIONAL EDUCATION PROGRAM DEVELOPMENT

1 Develop/Locate a Task Analysis

Skills & Knowledges of an Occupation

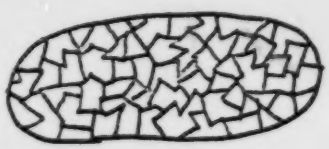
2 Select Skills & Knowledges

A Critical!

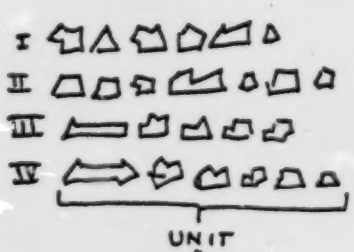
B Nice - to - Know

C Don't Teach; We'll Teach

D We Don't Do That Here



3 Gather Skills Into Units

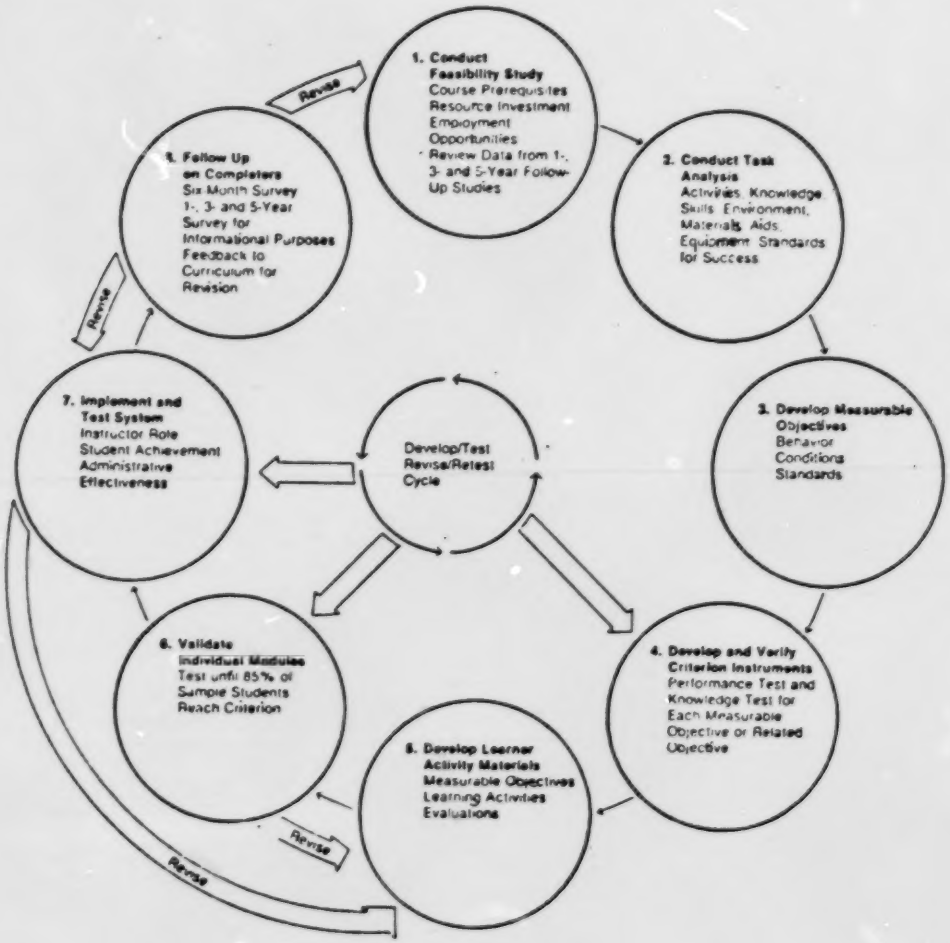


4 Write Specific Course/Unit Objectives

initially made up of the states in the Southern Association of Schools and Colleges — analagous to our North Central Association. These states developed a format which would be used by all the states, and this format included the very specific methods of task analysis that had initially been developed by the military. The format involved the development of an occupational structure of basically four levels. The first level was the occupation itself. Under that was listed a number of duties, perhaps ten to fifteen duties for each occupation. Each duty consisted of a number of tasks, operations, or precedures, and for each one of those tasks, a number of steps. On each page of the catalog, a single task was listed with the behavioral objective, the criterion reference measure (that is, the mastery test), and a performance guide (the steps that would be taken in the process or the task). What was not included in these catalogs was the information the student should learn, for the catalogs were not intended to be instructional tools. They were intended to be used as a task analysis format that could serve the instructor. Instructors who used this catalog could show it to local employers. They could then ask the employer to identify the critical skills by putting "A" by them, etc; and the instructor, therefore, could do as that initial initial instructor did ten years ago — that is, design a course that is specific to the occupations for which the person is being prepared in the location in which thay wish to work.

In 1977 Illinois joined that consortium, at a cost of about $20,000. Illinois paid about $2,000 for each of the catalogs they needed. The state is required, like the other states, to develop at least

Instructional Systems Development Planning Guide Flowchart



two new catalogs each year. Typically, states farm that job out to a university.

... The Illinois System...

Also, in the latter part of the 1970's, Illinois adopted the instructional system development program to help develop vocational programs at the secondary and post-secondary level. This program was described in a booklet known as "Specifications and Model Format for the Development of Vocational Education in Illinois," and it was an eight-step process similar to the one developed by the Job Corps fifteen years earlier.

A community college, in trying to decide how well it is serving its community, will look around periodically to see what new vocational courses or programs it should offer. In the process, it will decide if it is economical to offer a particular course or program. The college will ask questions such as, "What should the prerequisites be? How much money will the school have to invest? What are the employment opportunities for graduates?" It would look at follow-up studies and at state manpower information. The next thing a college must do is conduct, or preferably obtain, a task analysis in order to identify the activities, knowledge, skills, environment, materials, aids, equipment, and the standards for success that are unique to that occupation or that body of knowledge. The college must also find out what skills are necessary to obtain work in the local city, county or region. The college will then develop measurable objectives, with statements of behaviors, conditions, and standards. It will then develop and verify criterion instruments — formative and summative tests — and then go on to develop learner activity materials, validate the individual modules, test and implement, and follow up on the completers. This is the system now used in Illinois in vocational education.

... Mastery Learning Required by Military ...

I would like to sum up by saying, first, that all of the military services now develop their new programs using instructional system development and taxonomies, including Bloom's and Gagne's, and Mastery Learning principles (indeed, the mastery system has been required for about the last ten years).

... The Mastery Process ...

And, second, by summarizing the Mastery Learning process or, as vocational educators refer to it, competency-based instruction, which contains the five vocational education components shown at the bottom of your handout: (1) Task analysis — the materials, equipment, and the standard for success so that valid objectives and tests are possible. (2) Behavioral objectives, including conditions, behaviors, and standards. (3) Criterion evaluation based on those objectives. (4) Various taxonomies, including two cognitive taxonomies (Bloom's and Gagne's more recently developed one), Krathwohl's affective taxonomy, two psychomotor taxonomies (Dave's and Elizabeth Simpson's) and some in other specialized areas, such as language and physical education. And lastly, (5) there is a systems approach which incorporates the four other components and which provides for feedback to improve the course, including a flow chart, and a check list that (a) insure that things are done in the right order, (b) insure that the program is working, (c) assist in de-bugging the program, and (d) help in revising and improving it.

The five components of modern course design requiring mastery learning are:

1. task analysis so that valid objectives and tests are possible.
2. instructional objectives (conditions, behavior, standards).
3. criterion evaluation based on valid objectives.
4. taxonomies which identify types and levels of behavior.
5. systems which incorporate the above and which use feedback to improve the course.

... Mastery Learning in Vocational Education ...

Let me briefly compare vocational education's use of Mastery Learning with that of academic education. In academic education, the first step is to find a book or a body of content and then break it into increasingly small pieces until you finally get manageable units of instruction. Then objectives are written for the units and criteria are developed to test mastery of the objectives. After teaching the content, teachers give tests, and if student mastery is deficient, then individual remediation is assigned until each student reaches mastery.

... Mastery Learning in Academic Education ...

Vocational education is somewhat different, for vocational education starts with a task analysis that identifies jobs and operations. A job consists of one or more operations. Objectives are written for each operation, and a criterion test is developed for each objective. The students learn to do the operations and they are tested on their ability to do that procedure, operation or task. And, they typically don't go on to the next unit of instruction until they have mastered the previous one. Also vocational education usually involves smaller classes than academic education does; consequently, a lot of coaching takes place. So what academic education thinks of as individualized instruction, in fact, is the normal teaching mode for most of vocational education. The remediation process of academic education is basically the same in vocational education.

So, those are the differences. Academic education starts with content; vocational education starts with tasks. The former teaches large groups, and then re-teaches those who didn't learn the material. The latter teaches mostly small groups and does the re-teaching as it goes along. Academic education identifies the book as the first step; vocational educational identifies the book after it has decided what the objective is, perhaps as late as the fourth or fifth step in the process.

... Mastery Learning State-of-the-Art ...

Are we all going the same way, and are we all doing the same thing? Yes, we are. Vocational education and academic education have many things in common. Both use Mastery Learning, both use criterion levels of performance rather than norm-referenced ones. It isn't important how well a student does compared with his peers — it's only important that the student has learned the material or task that is necessary. Time is a variable, not a constant. Competence is the constant. And in both vocational education and in academic education, Mastery Learning is the wave of the future. Mastery Learning is not a phase. It is the state-of-the-art.

MASTERY LEARNING - PROGRAM DEVELOPMENT

ACADEMIC EDUCATION	VOCATIONAL EDUCATION
0. Select a text	
1. Formulate General Course Goals	1. Develop/Locate Task Analysis
2. Select Course Topics	2. Select Skills and Knowledges
3. Divide Topics Into Units	3. Gather Skills Into Units
4. Write Specific Course/Unit Objectives	4. Write Specific Course/Unit Objectives
5. Select Homework Assignments	5. Set Standards of Performance
6. Develop Formative Evaluations	6. Develop Performance Tests
7. Choose Correctives	7. Develop Learner Activity Materials - Order Books, Etc
8. Prepare Abilities Checklist	8. Validate Individual Modules
9. Develop Summative Evaluations	9. Implement and Test The System
10. Set Standards of Performance	10. Follow up On Completers
11. Write Orientation to Mastery Learning	11. Revise According to Feedback

MASTERY LEARNING AND THE AUDIO-TUTORIAL APPROACH TO LEARNING

BY
HERB ROSING
PROFESSOR OF PHYSICAL SCIENCE
LOOP COLLEGE

... What is the Audio-Tutorial Approach to Learning? ...

The audio-tutorial approach to learning involves the use of an audio tape that an experienced instructor uses to guide learners through a set of meaningful learning experiences that have been selected and organized to assist the learners in achieving an educational objective. The learners utilize a study guide while listening to the tapes. Primarily, learners work to attain information or skills they lack or need to review, and they work until mastery is achieved, although they can work at their own pace.

An effective audio-tutorial program keeps learners actively involved in the learning process, not just as mere listeners, but as doers. They may be directed to solve problems, to do an experiment, to give an example, to make a diagram, to interpret a graph, to draw a graph, to look something up, to read a paragraph, to write a paragraph, to give an opinion, to make a guess, to give a definition, to predict results, and so on.

While involving learners in one or more of these or other activities, an effective audio-tutorial program provides learners with frequent opportunities for self-evaluation and prompt feedback on how well they are doing.

... The Advantages of Audio-Tutorial Methods ...

What are some of the advantages claimed by those using audio-tutorial methods in their educational programs? Audio-tutorial methods have the advantages of:

1. Self-pacing, that is, allowing learners to learn at a rate which they find most comfortable.
2. Requiring active learner participation in the learning process.
3. Requiring learners to master the knowledge or skill they are studying.
4. Providing frequent opportunities for self-evaluation and prompt feedback.
5. Providing convenient opportunities for the on-the-spot diagnosis of learning difficuties.
6. Enhancing student motivation.

Now a brief comment about each of these advantages.

... Self-Pacing ...

Learners may repeat all, or any portion, of an audio-tutorial program as often as is necessary; learners are thus allowed to control how much to try to master at one time and to learn at a pace that best fits their learning style. The slower learner is not frustrated by not being able to keep up, while the faster learner is not bored or disturbed by having to participate in lessons already learned.

... Active Learner Participation ...

Effective audio-tutorial programs follow the principle that learning is not something done to the learner, but something done by the learner. Audio-tutorial learners are required to listen, look and do. They make observations, decisions, even guesses, while seeing, listening and touching. Active learner involvement is a major element of the Audio-Tutorial Approach to Learning.

... Mastery ...

If an audio-tutorial learner fails to attain the objectives of a lesson, he or she is usually required to repeat the program, frequently after being directed to an alternate or remedial program. This repetition increases the probability of

success and thus reduces frustration and the nagging fear of failure that so often destroys student motivation. In short, learners are allowed to learn from their own mistakes without penalty.

... Self-Evaluation and Prompt Feedback ...

The well-designed audio-tutorial program provides learners with frequent opportunities to determine for themselves how well their learning is progressing. This feedback provides them either with positive reinforcement or it directs them to prompt remediation.

... Diagnosing Learning Difficulties and Attending to the Needs of Individual Students ...

In a well-designed audio-tutorial program the instructor is better able to determine what might be preventing a student from learning, by noting what portion of the lesson the student finds difficult. Prompt remediation will then move the student ahead and reduce the probability of future errors. The instructor is also able to identify students who are learning rapidly and who could advance or benefit from enrichment activities.

... Enhancing Student Motivation ...

Student motivation and confidence are created and maintained by educational approaches that provide learners with successful learning experiences. The Audio-Tutorial Approach strives for this by centering its attention on learners and their activities, and by emphasizing self-pacing, mastery, prompt feedback, learner participation, and by providing concrete experiences and individual attention when needed. In the ideal situation students begin to need less external motivation because they develop internal motivation.

The advantages I have listed for the audio-tutorial approach to learning have also been claimed for other approaches to individualized education. But the unique feature of audio-tutorial learning is that the voice of a skilled and experienced instructor-programmer can be used to guide many learners, each individually, through learning experiences designed to achieve instructional objectives.

... Disadvantages and Pitfalls ...

What are some of the disadvantages and pitfalls of the Audio-Tutorial Approach to Learning? One of the claimed advantages of the audio-tutorial approach may turn out, at times, to actually be a disadvantage: the emphasis on self-pacing may lead to student procrastination.

... Student Procrastination ...

In coping with that problem, it is important to distinguish between self-pacing on a specific lesson and in an entire course. Self-pacing on a specific lesson is desirable. Here the learner controls the rate at which he or she absorbs the material. Student procrastination often becomes a problem when the student is allowed to determine his own pace throughout an entire course.

My observation has been that many community college students are more comfortable in structured educational programs than they are in largely unstructured courses or programs where, for example, their attendance might not be closely monitored. These students are more secure when activities and courses are scheduled for specific times and when they are assigned specific learning tasks.

... Advantages of Self-Pacing ...

Self-pacing in a course has certain advantages if student procrastination can be overcome. Fast learners, for example, can complete a course ahead of time and concentrate on other courses or activities, and slower learners do not feel the pressure to keep up. Students absent for a significant period of time may continue where they left off and catch up at their own pace. If a student has an abnormal amount of work in another course, e.g. a research paper or some special project, he/she may delay his/her studies in a self-paced course and start again when the work in the other course is completed.

... Adjusting to Mastery Techniques ...

Another disadvantage of audio-tutorial learning is the difficulty that some students have in adjusting to mastery learning techniques. At times all of us have difficulty adjusting to change, whether it is a change in surroundings or a change

in a way of doing things. The same is true for students, mastery learning, and the use of audio-tutorial. Accordingly, mastery learning teachers need to be especially careful in orienting students to audio-tutorial learning.

For example, I have had difficulty orienting students to mastery learning. Many students still turn in assignments on or after a test day expecting a grade even though I have directed them to turn in assignments before test day so that I can determine how well they are prepared for the test. Students need to be convinced that grades are not rewards, but a gauge of learning and achievement.

... Audio-Tutorial and Mastery Learning ...

How can the audio-tutorial approach to learning be utilized in a mastery learning program? First, it can be used as the primary method of instruction. This is especially advantageous when self-pacing is a major component of the Mastery Learning course. In a relatively unstructured program, learners come to the audio-tutorial center on their own; in more structured programs, individuals may be scheduled for a specific number of periods per week.

My preference is to have entire classes scheduled into the audio-tutorial center for a certain number of sessions per week. This seems to me to be a more efficient use of time. The instructor and the supportive staff should be present to assist a large number of students in the same time period. Attendance should be recorded, and each learner should proceed through his assigned program at a rate determined by the difficulty of the material and his rate of learning.

... Correctives ...

Second, the audio-tutorial approach can be used effectively in the corrective phase of Mastery Learning, in addition to personal tutoring, the use of programmed learning materials, and computer assisted instruction.

In order to tutor students, our mastery learning managers have used audio-tutorial study guides without the tapes. For all practical purposes the tutor takes the place of the tape, and because the tutor is present with the student, he/she can firmly guide the student through the lesson. One suggested approach to tape production is to have a learner respond to an instructor while the program is being recorded, thus creating an audio-tutorial program that is the result of a well-planned tutoring session.

... The Loop College Audio-Tutorial Center ...

A mobile audio-tutorial center was used in the Physical Science Department at the Loop College in the Fall Semester, 1981. It was the initial attempt at using the audio-tutorial approach for instructing students. The faculty is grateful for the invaluable advice and counseling obtained from Dr. Rocco Caponigri and the enthusiastic and prompt support of Dr. Salvatore G. Rotella.

... Developing Audio-Tutorial Programs ...

How does one develop audio-tutorial programs? Although there is no one formula for creating audio-tutorial programs, here is a procedure that has worked for me:

1. State the objective(s) of the program
2. Plan and list possible learning experiences that would guide the learner to achieve the objective(s).
3. Sequence the learning experiences.
4. Construct evaluation instruments.
5. Write a script for an audio presentation that will guide the learner through the learning experiences.

(The script may be a detailed narration or an outline to serve as a guide for tutoring the learner. My experience has been that the outline results in a less formal and more relaxed presentation.)

6. Construct the study guide for the learner to use while listening to the audio presentation.

(You might prefer to construct the study guide first so you can use it as a guide when writing the script.)

7. Construct Appendix 1 - Correct Responses to Practice Exercises.
8. Construct Appendix 2 - Additional Practice Exercises.

(The additional practice exercises may also be used as correctives.)

9. Obtain "tangibles", reference books, etc. required by the program.
10. Rehearse program.
11. Record program.
12. Student-test program.
13. Revise program.

... Another Development Approach ...

Another approach to developing tape programs I call the "Shot Gun Approach," which involves recording a class session on tape. The instructor should repeat all student questions and comments to make sure they are recorded on tape. The teacher should also copy all chalk board work and diagrams to use in constructing a study guide. Any handouts given to the class should also be included in the study guide. The study guide can be refined when the instructor listens to the replay of the class session pretending that he/she is a student in the class.

Most of the time, creating a taped program is interesting and challenging, but it requires a large amount of effort. For example, it may take many hours to create a 15 minute (running time) program, depending on the programmer's familiarity with the subject.

A 15 minute program I developed on the accurate use of the ruler — to many a simple and trivial skill, but yet one lacking in many of our basic chemistry students — took many hours to create and produce. It was a worthwhile effort, for that skill helps students learn how to measure in the laboratory. Without it, the learner is not able to read scales on laboratory glassware, mass balances and thermometers.

... Other Development Methods ...

The variety of approaches to the utilization of audio-tutorial instruction is limited only by the creativity and commitment of the instructor-programmer. A few examples:

1. Interview on tape an authority or specialist in a field and interject the interview into or use it as a basis for an audio-tutorial program.

2. Record class sessions that have been pre-planned and organized.

3. Take a tape recorder to a museum. Record your reactions to and describe exhibits and displays. Take slide photographs of the exhibits and displays described. The tape and slides can be interjected into or be used as the basis for an audio-tutorial program.

... Keeping the Faith ...

About five years ago I attended a workshop in audio-tutorial instruction given by Dr. Samuel Postlethwait of Purdue University. He is generally considered to have initiated and pioneered the audio-tutorial approach to learning. That experience turned me on to audio-tutorial learning and its potential as an alternative method of instruction. That experience also provoked a flow of ideas for audio-tutorial programs in my academic field. Already I have more than enough ideas in storage to occupy me for the remainder of my teaching career, that is, if I "keep the faith."

MASTERY LEARNING AND THE MICROCOMPUTER

BY
CHRIS DIMAS, DIRECTOR
COMPUTER SUPPORTED INSTRUCTION
CITY COLLEGES OF CHICAGO

Computers have been used in education for about two decades now; however, with the advent of the microcomputer three years ago, the educational community in general quickly became interested in the possible uses of computers in education. Although educators in the field of computer-assisted instruction had done some outstanding work, most were content to take a "wait and see" attitude, some out of a fear that they might be replaced by the computer, while some no doubt thought that computer-assisted instruction was just too cumbersome.

... Smaller Computers More ... Accessible to Educators ...

The microcomputer seems to have awakened the educational community because educators are now able to have control over their own personal computers. The microcomputer has also awakened the intellectual curiosity of the educator. Even educators near retirement are beginning to examine the computer and question whether it could have an impact on student learning. Having grown up with television, many young faculty members see the computer's place in education as part of a natural sequence in the electronic age and therefore are not quite as intimidated by computers as older faculty.

It is unclear whether computers will fulfill their promise to revolutionize education. Remember that at one time motion pictures, radio, and television all made a similar promise. Remember also the "systems approach," which relied on the use of behavioral objectives, criterion-referenced tests, various media, learning packets, CAI, textbooks, and, most important, the teacher acting as a learning facilitator, counselor, and resource person. After being in vogue for about ten years, this system slowly slid into oblivion about seven years ago. One reason for its demise was perhaps that its approach to instruction was too comprehensive; too many ideas were being introduced at one time. It was simply too difficult to motivate educators to abandon familiar teaching techniques and replace them with the new skills required by the systems approach. Although eager to implement the systems approach, many administrators did not fully understand the extent to which new technology and new materials, not to mention money, were necessary; nor did they understand the extent to which in-service training was necessary for the faculty. Most faculty could not picture themselves as anything other than lecturers. And, paradoxically, most students were not ready to accept more of the individual responsibility for their own education, despite the fact that they had clamored continually for this role.

... Microcomputers and Mastery Learning ...

Despite the problems inherent in the use of new educational techniques, we are here to examine the role of microcomputers and Mastery Learning. Old wine in new bottles? I don't think so. Many changes have taken place in the past eight years, and these changes have begun to influence the way both students and educators view the learning process.

... PLATO in the City Colleges of Chicago ...

For example, the educational community has had the benefit of over a decade of experience in using large or mainframe computers for instruction. Here at The City Colleges of Chicago, we have found that students who used PLATO (a mainframe computer-assisted instruction system) received higher grades than students who did not. Furthermore, in studies that we have conducted over the past seven years, over 90% of the students have indicated that they liked to use PLATO because it lets them take part at each step of the lesson and 74% feel that they do better in classes in which PLATO is used to provide tutoring (obviously, there is no dis-

crepancy between student perception of achievement and their actual achievement). Students also indicated that they liked being able to learn at their own pace, and that they liked avoiding the embarrassment of making mistakes in front of a group.

.... Three Types of Computers ...

Before proceeding, I would like to briefly discuss the various types of computers in order to provide an overview of the field and also a perspective of how rapidly the field has and continues to evolve.

The three categories of computers are the mainframe, the mini, and the micro. Mainframe refers to the large computers such as the IBM 370 and the CDC Cyber-73, which are capable of supporting 60 to 625 terminals at one time. These computers are extremely expensive, usually costing millions of dollars, and they require a highly qualified staff to operate them. The power of these computers allows them to support sophisticated computer languages such as APL, PL/I, and Smalltalk, and TUTOR, which in turn makes them easier to program and more able to provide sophisticated lessons. The mainframe at the University of Illinois presently supports approximately 1200 terminals, of which 625 may be active at one time. These terminals are supported on a time-sharing basis. For example, in the PLATO system, once every second or less a terminal is "visited" by the main computer, and all of the necessary functions are performed within two hundredths of a second. All of the active terminals are visited before the computer returns to visit that same terminal.

The minicomputer came on the scene during the late sixties. This computer typically has from 64,000 to 500,000 words of memory and can usually support from 4 to 32 terminals. An example of a minicomputer is the PDP 11,44, produced by DEC, and the Motorola 68000. Since minicomputers are much lower in cost than the mainframe, most colleges can own one or more, even though the cost from $20,000 to $150,000 still makes them unattractive for personal use at home.

The microcomputer made its debut in education in the late seventies. These computers take up about as much room as a standard typewriter, and generally have from 16,000 to 48,000 words of memory. However, the use of floppy disks permits lessons to be easily and quickly loaded into the computer's memory. The cost of a microcomputer can be as low as $399; however, even the most casual user after a few months realizes that this basic unit is inadequate and that it is necessary to add additional memory, disk drives, and peripheral devices in order to accomplish a simple programming task.

... Communication Between Computers ...

In addition, something new is almost upon us: the linking of mainframe, mini, and microcomputers by phone line in order for them to communicate with each other. For example, CDC has developed a stand-alone PLATO-type terminal (which can be termed a "micro") with disk drives that can also communicate with a large mainframe computer. The mainframe can load a lesson into the micro in minutes, or a disk can be loaded manually.

Most of us in education have been deluged this past year with salesmen from publishing houses who have become "computer experts" in order to sell microcomputers as well as books. These salesmen claim that the microcomputer can easily obtain lessons from any number of computers throughout the country via telephone line. Although this is possible in some cases, at present it is not practical because of the incompatibility of hardware and software, or, when the languages are compatible, because of the lack of lessons.

... Machine Compatability ...

In the future, however, microcomputers will communicate regularly with other computers as lessons are developed and distributed and as the languages become machine-compatible. No doubt a large mainframe will have the primary task of downloading these lessons to the microcomputers, or of providing a timesharing capability to on-line users. Phone-line costs will probably dictate that users purchase disk drives in order that the mainframe can download to the microcomputer, thus saving phone line costs. If a major publisher obtains enough lessons, we can expect it to provide microcomputer users access to the publisher's mainframe.

Clearly, the limitations of mini and microcomputers will diminish as time goes on. People will eventually be concerned not with whether they are communicating with a mainframe, a mini, or a microcomputer, but with whether they have immediate access to a particular lesson or program.

... Ways to Use Computers ...

Although there seems to be no single best way to use computers for instruction, the following is a summary of the main ways in which computers are used for instruction:

Tutorial: Students are taught a unit of study entirely by the computer.

Drill and Practice: Students are taught a unit of study by the teacher; the computer provides drill materials until the students reach a certain level of proficiency.

Simulation: Students who have been taught the fundamentals of a particular subject can apply this knowledge in a life-like simulation on the computer where they can gain experience yet avoid situations where the risk is too great, the time span too long, or the logistics insurmountable. For example, a medical student or intern might be provided with a patient's symptoms and then be asked to make a diagnosis and prescription. After each prescription has been entered, the computer evaluates the patient and provides the student with feedback on the patient's progress.

Another example is the simulation of an experiment on the mating of fruit flies in order to determine their genetic characteristics, an experiment which would normally take a great deal of time to complete in the laboratory. Besides saving time, such simulations also allow students to manipulate variables in order to gather information, such as in a study of population growth where, within seconds, a student is able to project the need for schools and hospitals by manipulating the rates of birth and mortality in a given area.

Computer-Managed Instruction (CMI): Students are directed to various computer materials and activities because of their performance on a pre-test on a subject of unit. After studying the material, the students take a post-test on which they are graded. If they reach a certain criterion level, they can progress to the next unit; if not, they are provided an additional educational corrective (or prescription) via the computer. This process can be usually repeated until the appropriate level of achievement is reached.

Computer Programming: Students are taught how to write programs in order to solve problems encountered in their courses. For example, at Dartmouth College all entering students are taught how to program in BASIC, and they are expected to use this skill thoughout their college careers.

... Computers Free Teachers ... From Routine Tasks ...

Since it is clear that computers can offer a variety of services to the educator, the question is what are the ramifications for Mastery Learning? The most obvious are those which have been made with mainframe and minicomputers. CMI has been used effectively for about the past fifteen years and has most of the same ingredients as Mastery Learning, including course and unit objectives, as well as criterion-referenced quizzes and correctives. Combined with the microcomputer, CMI can free the teacher from some of the time-consuming and repetitious activities like administering, grading and recording unit and summative quizzes and guiding the student to corrective material based on student performance. Mastery Learning advocates can surely benefit by becoming familiar with CMI.

... Teachers Can Spend More Time With Students ...

Using the computer to help with the "busy work" of Mastery Learning will therefore free the teacher to help students on an individual basis to achieve content mastery and understanding the ramifications of their newly acquired knowledge. Teachers will also have more time for counseling and motivating their students, and, finally, for recognizing that students are people who are more than "consumers" of knowledge.

One of the benefits of this teacher-student contact is that it enhances student self-concept. When teachers also provide students with course content that has been carefully programmed into manageable steps leading to mastery, students will become even more positive about themselves. The combination of positive faculty interaction with individual students with student mastery of units of study will result in an ever-ascending cycle of achievement, both on an academic and personal level.

... Academic Self-Concept ...

A person's self-concept is a prime determiner of whatever he or she will accomplish (Wylie 1961). Self-concept can be taught, and whatever can be taught falls under the domain of educational institutions (Combs, 1962). Faculty can perform those creative acts which result in

greater student achievement and positive self-concept, provided they are freed from such mundane duties such as administering, grading, and recording tests. The power to provide such freedom is here, but it remains to be seen whether the academic community will grasp the opportunity.

... One Possible Future for CAI ...

Ten years ago I wrote a report describing what education would be like ten years in the future. In this paper I described a fictitious instructor, Mr. Jones, beginning his day by walking to the learning center and picking up computerized progress reports on his students. After evaluating the reports, he met briefly with each student in order to plan how the objectives of a unit would be reached. Students would then utilize videotapes, programmed learning, learning modules, large or small group instruction, tutoring or CAI in order to meet those objectives. After working with individual students in the learning laboratory, Mr. Jones spent additional time leading group discussions in order to determine what the students had learned. The instructor then spent time following up on certain students by means of telephone calls and individual conferences. Finally, the day closed with a meeting where department members carefully worked out several plans designed to help students reach unit objectives.

Although I thought this futuristic report was rather unique, I soon discovered that many others had written similar papers. However, none of this ever came true, except in isolated instances, and usually only when supported by government funding.

A similar opportunity for educational alternatives will probably not come again in the near future. Moreover, whereas the latest possibility for a learning revolution probably will be in the hands of the students, if students decide to take the initiative for their own learning.

Gerald Gleason (1981) reported that the Carnegie Foundation projected that by 1985 every college student will own a microcomputer. Today publishers are beginning to develop whole courses of study for computers. In the past, when publishers were selling only textbooks, little evaluation of instructional material took place. With the advent of computers, educators are asking more questions about the validity of particular instructional techniques. If publishers can state, for example, that a CAI course can bring about desired results, it is quite likely that a certain percentage of students will simply buy the course and take it at home. When they have finished the course, they will earn college credit by taking something equivalent to a CLEP test or by obtaining credit for life experiences. I do not mean to say that the classroom is in jeopardy. Far from it. However, students with unusual schedules and learning styles may find this mode of education appealing.

From the faculty point of view, the teaching/learning process in the age of computers should become more rewarding. Presently, teacher "burnout" is reaching epidemic proportions. And why not? After years of repeating the same content, instructors may begin to view themselves as machines and become negative toward their students and their teaching. This is especially true in classes with slow learners. After all, how can one be called a teacher if the students are not learning?

... The Microcomputer Will Humanize Teaching ...

The microcomputer will humanize the teaching-learning environoment by permitting the faculty to perform those functions which can only be perfomed by human beings, while delegating functions which are repetitive and mechanistic to the microcomputer. All faculty will be allowed to become as creative as they wish in the teaching-learning process, and, in so doing, they will experience greater job satisfaction. In return, we can expect greater achievement from students not only because of the changing faculty role, but also because the various paths to content mastery have been well marked, with many vehicles available for its achievement.

THE GRANT APPLICATION PROCESS

BY
ELLEN FILURIN, DIRECTOR
OFFICE OF GRANTS AND PROGRAM PLANNING
CHICAGO CITY-WIDE COLLEGE

Initiating a proposal is a complex process. Basically, however, this process can be separated into two parts: (1) developing a concept for a grant, and (2) preparing a grant application.

... Developing a Concept ...

The first step in developing a concept is to identify and state the problem. It is not enough to want to do a project. There must be a succinctly stated need, and that need must be justified by supporting data, not only in the context of the local situation, but also in terms of its wider social implications.

Once a need has been identified and validated, alternative approaches to solving the problem must be considered. Then certain questions should be asked: Are the services to be provided or activities to be undertaken consistent with the mission of the institution? Is the proposed activity already being done? Can the program be conducted within the structure of the institution? Does the institution have the commitment and resources to carry out the program? Since grants are time-limited, can the program, if successful, be institutionalized; that is, can its activities be absorbed into the local budget upon termination of the grant? If the answers to these questions are positive, then the institution or individual can proceed through the remainder of the grants process.

... The Decision to Apply for a Grant ...

Appropriate resources are often already available somewhere in the institution. If so, these resources should be closely examined for possible use. When it is determined that external funds are needed, an appropriate source of funds must be identified.

... Types of Grants Available ...

Several types of grants which may be appropriate in meeting local needs are as follows: Demonstration Grants: Such grants are awarded to institutions seeking to demonstrate the viability of an innovative concept or program. Implied in such a grant is the development of a model that can be replicated by other institutions. The number of participants targeted to receive direct services need not be large; however, the applying institution must: (a) identify a socially relevant problem, (b) set forth an innovative method of solving this problem, and (c) bring to the project appropriate resources and a history of prior success in solving similar problems.

... Direct Service Grants ...

Direct Service Grants: As the title implies, funds are available to an institution to provide direct support services to students. Often the funding agency will designate a specific target population, such as a particular minority, disadvantaged or handicapped students. The funding agency, as a rule, also will define the services eligible for funding: counseling, tutoring, career guidance, job placement, and/or services for the handicapped. Proposals for direct service grants should be designed to have a maximum impact on the target population within budget constraints. The program should include services not routinely provided to students. Direct service grant programs should be replicable by other institutions if successful. Dissemination of the results is often a requirement of such projects.

... Curriculum Grants ...

Curriculum Grants: Such grants include funding for curriculum development, and the

improvement of instruction and educational delivery systems. Some of these grants require only the development of a final product such as a curriculum or a course; others allow for the pilot-testing of that product. In general, curriculum grants require that the product be appropriate for use in other educational institutions.

... Planning Grants ...

Planning Grants: Funds for planning for new services and programs are limited. Planning can, however, be supported as the initial phase of a demonstration, direct service, or curriculum grant.

... Research Grants ...

Research Grants: Research grants provide funds for testing and validating hypotheses developed in existing programs. Research grants can also provide direct services to an experimental group of students. Hopefully, research findings will have an impact on the total operation of the institution. The research design must be applicable to other institutional settings.

... Locating Sources of Funds ...

A key to successful grantsmanship is locating an appropriate source of funding.

Federal Funding

Two publications are particularly useful in locating federal funding sources:

The Catalog of Federal Domestic Assistance is published annually by the U. S. Government Printing Office. It is a useful reference in determining the range of grants available at the federal level as well as the specific agencies within major federal departments that make funds available. Although the Catalog is cross-referenced, experience has shown that the alphabetical subject index is the most useful. Each grant program available during a given year is described in the following detail:

Federal Agency (locus of funds)
Authorization (legislative)
Objectives
Type of Assistance
Uses and Restrictions (of funds)
Eligibility Requirements (of applicant)
Application and Award Process
Assistance Considerations (matching fund requirements and duration of projects)
Financial Information (level of funding)
Program Accomplishments (number and location of grants awarded during the previous fiscal year)
Information Contacts
Related Programs

All announcements of federal grants appear in the Federal Register, a daily publication. The announcements, or "notices," include a statement of program purpose, deadline dates for receipt of applications, and the criteria for selection. Also included is an address and/or a telephone number from which an application packet, consisting of instructions and forms, can be obtained.

... State and Local Funding ...

State and Local Funding: Most state and local agencies utilize Requests for Proposals to announce the availability of funds. Requests for Proposals are issued to selected institutions which the agency deems capable of performing designated tasks.

... Foundation Funding ...

Foundation Funding: Foundations, as a rule, do not solicit applications, although they do specify the types of institutions or disciplines they will support, i.e., educational institutions, schools of medicine, libraries, or such disciplines as the arts, science, or foreign languages. A useful source for identifying appropriate foundations is the Foundation Directory, which lists all the foundations in the United States alphabetically by state, the types of programs each supports, the average amount of grant awards, and the name and address of a contact person. An alphabetical subject index is located at the back of the Directory.

... Pre-Application Procedures ...

Some agencies and foundations require submission either of a letter of intent to apply or a concept paper prior to submission of a formal proposal. A letter of intent is used by the agency as a means of assessing the number of proposals they will receive. In this way they can determine the amount of staff time or the number of readers

they will need for the selection process. Submitting a letter of intent can be accomplished either by filling out a short form designed by the agency or by sending in a short letter prepared by the institution/individual wishing to submit an application.

A concept paper, usually no more than five pages long, is used by the agency or foundation to determine if the proposed plan is consistent with its funding priorities. A concept paper includes all the elements of a formal proposal in abbreviated form, and can serve as a framework for developing the final document. Acceptance of the concept paper is an invitation to submit a final proposal.

If an institution fails to submit a letter of intent or a concept paper by a specified deadline date, it cannot submit a full proposal.

... Developing an Application ...

A final application consists of three parts: forms, a program narrative, and a budget:

Preparation of Forms: The forms usually included in an application packet are: (1) a title page, (2) assurances of compliance with federal civil rights legislation, and (3) budget forms.

Writing a Program Narrative: The narrative statement, often referred to as a proposal or work plan, is the most crucial component of a grant application. If a narrative outline is provided in the application packet, the outline should be followed exactly. If an outline is not provided, a standard format consists of:

a. Statement of purpose
b. Statement of the problem and the need for the program
c. Goals and objectives
d. Statement of institutional capabilities
e. Plan of action (including a timetable for implementation)
f. Plan for evaluation
g. Discussion of results and benefits expected

a. Statement of Purpose - This section should include a brief overview of the purpose of the program: the population to be served, a synopsis of the plan of action, and, in some instances, some information on costs.

b. Problem and the Need for the Program - This section should include a succinct statement of the problem the program will address, plus supporting data from external as well as internal sources, and a statement of how the proposed program specifically addresses the problem.

c. Goals and Objectives - A goal is a general statement of what is to be achieved. A measurable objective must be quantifiable and must have a time frame. An objective states only what will be done, not how it will be done. It is important that the writer be skilled in stating objectives in measurable terms, although the degree to which stated objectives will be measurable is a matter for careful deliberation.

A well thought-out proposal will contain only a few precisely-stated objectives, rather than a long, rambling list of things to be done. If the project is funded, well stated objectives will be valuable in establishing the initial direction for the day-to-day management of the grant and in evaluating progress and achievement.

d. Statement of Institutional Capabilities - Applicants should not assume that a funding agency knows anything about the applying institution. Thus, proposals must contain a brief description of the the applying institution and its appropriate department or unit. This section should include the resources that will be used to supplement or complement the proposed program. This section also can be used to describe how the project will be administered in terms of the total institutional structure. If a section on institutional capabilities is not required as part of the narrative outline, the information can be included in the introductory paragraphs of the Plan of Action.

e. Plan of Action - The plan of action should relate directly to the stated objectives of the project. Each objective should be addressed in terms of how it will be achieved in what span of time. In this section, all prospective staff members should be listed along with their job descriptions. Clerical and part-time employees should be included. The vitae of all full-time personnel should be appended to indicate the strength of personnel resources. It is always helpful to the reader if a simple timetable for the total project is included in this or a separate section.

f. Plan For Evaluation - The evaluation of the project must also relate directly to its stated objectives. Precisely stated objectives will dictate the kind of data to be collected. The evaluation design -- for the purposes of a narrative statement -- must at least consist of a specific list of data to be collected, the

instruments by which the data will be collected, and the inferences to be drawn from the data.

g. Discussion of Results and Benefits Expected - This section must relate to the statement of the problem and the need for the program as well as to the goals and objectives of the program. Both short-term benefits, i.e., benefits to project participants, the institution, and the local community, and long-term benefits, such as how the project might be replicated in other institutions, should be discussed.

... Preparation of the Budget ...

The Preparation of the Budget: Although a budget is usually completed after the program narrative is written, the budget should be considered during the initial phases of the application process. A grant writer often begins by posing the questions, "What am I asking for?" "What personnel and materials will be needed to operate the program being proposed?" Often the level of funding will be established in the application packet, thereby setting limits on the implementation of the project.

Above all, a budget should be realistic. Costs should not be inflated nor underestimated, yet they should be adequate for carrying out the proposed program activities. Nothing should be requested in the budget that is not explained in the program narrative. A budget should include projected cost increases in salaries, space rental, and materials, especially if the project spans more than one fiscal year.

A budget usually consists of two parts: budget forms and a budget narrative (explanation). Some agencies provide forms which elicit budget totals in general categories: personnel, direct costs, indirect costs. The agency will indicate in the guidelines those costs that are "allowable" and the budget category to which they are charged. Instructions for completing budget forms should be followed exactly. All agencies require a budget narrative, explaining how costs were calculated.

... Standard Budget ...

A standard budget will include the following categories:

.... I. Personnel ...

A. Salaries - All personnel, both full-time and part-time, who are employed by the project must be listed under this section. Full-time salaries must fall within the range of regular institutional salaries for similar positions. Part-time salaries of faculty, administrators or clerical staff must be based on the actual documented time that an individual spends on project activities.

If part-time personnel are to be employed, they may not be paid less than the federal minimum wage. Ideally, part-time salaries should fall within the range of salaries for similar positions.

B. Fringe Benefits - Fringe benefits should be calculated for all full-time personnel. Fringe benefits charged to the grant can include FICA, hospital/medical insurance, life insurance, dental/vision insurance, workmen's compensation, unemployment insurance, and/or retirement. Some agencies require that fringe benefits be itemized.

... II. Direct Costs ...

This section includes costs, other than personnel, necessary to the operation of the program. Such costs include the following:

A. Supplies - Include those supplies needed for the conduct of daily office activities, such as paper, pens, and paper clips. The cost of supplies can be estimated on a cost per person basis, such as $5 per person per month, or on an estimated monthly basis. The cost of postage and duplicating may be included in this section or listed separately. The institution's Business Office usually can provide an estimate for postage and duplicating costs, depending on the nature of the project.

B. Educational Materials - Educational materials are those books, publications, and handouts that are needed by project participants. Where possible, educational materials should be pre-identified, and actual costs, including delivery, should be requested. Costs also may be estimated on a per client basis.

... Equipment ...

C. Equipment - Both office and instructional equipment are included in this section. Most agencies will not pay for the purchase of equipment. They may, however, pay for equipment rental.

Office equipment includes such items as desks, chairs, typewriters, and file cabinets. Each

item and the quantity needed should be listed. The institution's Business Office can provide unit costs for items to be purchased and/or an estimate of rental costs.

Often instructional equipment such as projectors, tape recorders, video playback units, or computer terminals is required for the adequate operation of a project. The need for such equipment should be well documented in the program narrative and should be reiterated in abbreviated form in the budget explanation or narrative. Unit costs and/or rental estimates can be provided by the Business Office. Costs of needed software are usually charged as supplies.

... Travel ...

D. Travel - This section includes both local and out-of-town travel, unless otherwise stipulated by an agency. Travel for those staff members for whom travel is an integral part of the job can be estimated on a per person basis.

If out-of-town travel is an allowable cost, specific, job-related trips, such as to professional conferences, should be listed. Costs include transportation, housing and per diem.

E. Professional/Technical Services - Often a project will require the services of part-time consultants, resource persons, or technical experts. Charges for these services should appear in this section. Some agencies specify a maximum hourly or daily rate. If no rate is set, estimates should be calculated in the way that salaries are calculated — on the basis of education and/or experience. If a consultant is brought in from outside the area, costs of transportation, hotel, and per diem also should be included.

... III. Indirect Costs ...

Indirect costs are those expenses, such as payroll, insurance and accounting, incurred in the administration of the grant. Most agencies allow such indirect charges. Most institutions have been assigned a negotiated indirect cost rate by the U. S. Department of Health and Human Services. Unless otherwise specified, this rate is the maximum that can be charged.

... Matching Funds ...

Matching Funds: Some agencies and foundations require that the institution share a specified percentage of the cost of a project. The institutional portion is known as "matching funds". A match can be "in-kind" or "cash." An in-kind match can be determined by assigning a dollar amount to those existing college resources that will be utilized in the conduct of the project. These may include portions of salaries, classroom or office space, furniture and/or equipment not requested as direct costs. All in-kind contributions must be capable of being documented with payroll records, bills, auditron count of Xerox copies, etc. Cash contributions are what the term implies: funds set aside in the local college budget for this purpose. If funds for a cash match are unavailable, the institution should not apply for a grant requiring such funds. Matching contributions can appear either as a separate column on the budget forms or on a separate form or sheet and must be detailed in the budget narrative.

This presentation is intended to enumerate and explain the major steps included in preparing a grant application. The points covered are listed in a "logical" manner. In reality, however, an application will not be prepared in such a fashion. It is for each writer to determine an approach that is "comfortable" and workable. In all probability, that approach will not be developed on the first try.

Not every application can be funded. The competition for limited financial resources is great, and failing to receive funding is not necessarily a reflection on the writer's capabilities. Also a good proposal may have been submitted to an inappropriate agency, or the readers may have been biased. Federal agencies will normally send the writer the reader's comments. These are useful in determining the shortcomings, if any, of the application. Once criticisms are addressed, the application may be submitted again for reconsideration during the next funding cycle.

The funding process is a long one. There often is not enough funding to meet immediate needs, but each grant award moves an institution closer to meeting the goal of better serving its students and the community.

A TECHNOLOGY FOR SCHOOL IMPROVEMENT

BY
MICHAEL KATIMS & BEAU FLY JONES
MASTERY LEARNING PROJECT
CHICAGO PUBLIC SCHOOLS

When Coleman published his massive study of school effects in 1966, the topic of school improvement was barely discussed. His conclusion (also Jensen, 1969; Jencks, 1972) was that school effects were virtually non-existent. In his model predicting school outcomes, schools were portrayed as merely passive vehicles for translating pre-school probabilities into adult norms. Since that time, school effects research has focused on the identification and analysis of "maverick" schools which manage to educate their students despite predictions to the contrary. These are schools with students of low socioeconomic status who achieve at levels far higher than is typical. (Such schools have been identified in many studies: e.g. Brookover, 1977, also Weber, 1971, Klitgaard and Hall, 1973; Edmunds and Frederikson, 1978). Furthermore, reviews analyzing these studies have revealed a consistent set of factors or characteristics of the successful schools (Austin, 1979; Edmunds, 1979; Clark, Lotto & McCarthy, 1980).

... Effectiveness Checklist ...

School improvement is a "hot" topic, and a method of evaluating schools by using an effectiveness "checklist" has been developed by the Council of Basic Education (Appendix A). Organizations as diverse as NIE and local newspapers are using the checklist as a tool for improving schools.

... Maintain an Expectation of Success ...

However, a checklist is not a cure-all. It may describe what attitudes and behaviors ought to exist, but it does not explain how to arrive at these attitudes and behaviors. For example, one of the most important recommendations in the checklist is that schools maintain a strong expectation that students and faculty will be successful. Research shows that successful schools have clear and specific instructional goals and standards and that students are expected to achieve these goals. But what can a principal do if students persist in not achieving these goals?

Similarly, most of the checklist's questions are related to the diagnosis and remediation of learning problems: "Are there checks for student mastery of basic skills and knowledge? Are academic problems diagnosed early and dealt with promptly? Is promotion based on scholastic achievement rather than time spent? Is there a coherent plan for regular assessment of students?"

... Fulfilling the Checklist Requirements ...

Yet, the critical educational problem is not the assessment of learning progress but rather the initiation and maintenance of such progress. Teachers and principals are all too aware that students are failing to master basic skills and knowledge. And even though a more systematic method of checks for mastery will more precisely define learning problems, it will not provide any information as to how to solve these problems. In fact, almost all the items on the checklist depend on, but do not address, the success of instruction in the classroom.

... Continuous Progress/Mastery Learning ...

Chicago has a system-wide program for elementary school improvement: the Continuous Progress/Mastery Learning (CP/ML) program in reading. This program includes many of the components addressed in the checklist: clearly stated instructional objectives, a criterion referenced (i.e., objectives based) assessment system and schedule, system-wide achievement goals and accompanying monitoring systems, and a competency based promotion policy. However, what makes the Chicago Mastery Learning Reading Program unique is that it also uses a completely specified and fully field-tested instructional system, including the Chicago Mastery Learning Reading (CMLR) materials for teachers.

These materials have been designed so that they virtually assure success in the classroom, and teachers, given little training or support, can use the materials to teach reading through Mastery Learning. Initial results indicated that the materials provided both teachers and principals not only with a technology for implementing Mastery Learning in the classroom but also with a technology for improving the schools.

... Chicago's Mastery Learning Reading Program ...

The philosophy and techniques of mastery learning are particularly suited to the instructional and administrative needs of a large school system. Its belief that all children can learn is consistent with the obligation of universal education, and its method of specifying the elements of quality instruction provides a framework for the system-wide management of instruction. The Chicago Public Schools have been committed to this philosophy and these techniques for some time and have been building the CP/ML program for over a decade. In each step of development the system has become more completely specified and standardized. And with its imminent completion and implementation district wide, we may have in place a technology for the improvement of all of the Chicago Public Schools.

... Specify a Sequence of Instructional Objectives ...

The first step in the development of a mastery learning program is to specify a sequence of instructional objectives. Accordingly, the Chicago Public Schools developed the Curriculum Guides in Elementary Reading, which specify over 1400 instructional objectives for kindergarten through 8th grade. These guide lines also give clear behavioral objectives for teaching and testing. Of these 1400 objectives, 273 "key" objectives were selected and placed on individual pupil mastery record cards, where teachers could record each student's mastery of the specific key objectives. Furthermore, traditional grades were abandoned and schools were organized around the 13 reading levels of the continuum. At this stage, all pupils were identified, grouped, and taught in terms of a standard set of instructional objectives so that placement and progress could be maintained city-wide.

... Criterion-Referenced Tests ...

However, there were still problems. Some teachers found that students in their classrooms had not really mastered skills that were marked on their cards. So a central set of criterion-referenced tests (CRT's) was developed for the standardized assessment of the mastery of the key objectives. Even more vexing was the city-wide dilemma that students simply were not making appropriate progress through the matrix of objectives and tests. Principals were not able to use the tests and record cards to monitor and improve instruction nor to increase the expectations for progress. So a system of administratively imposed goals and accompanying monitoring forms and procedures was instituted. Yet even with these tools for school improvement, progress has been slow and marked by frustration, mainly because there were simply too many objectives and tests to be mastered in order to meet the goals. Without more effective instruction, the system was plagued with the same problems as the checklist.

... CMLR Materials ...

The CMLR materials have been designed to address these fundamental problems. For each of the thirteen levels of the reading curriculum, teachers are provided with two parallel sets of mastery learning instructional units: comprehension units which teach the comprehension objectives and skills units which teach word attack and study skills objectives. Each unit contains all the materials necessary to help the majority of the students in a classroom master the objectives, including: detailed structured lessons for presenting the instructional narrative and learning clues; corresponding learning activities that allow students to practice the skills in the formats in which the students will be evaluated; formative tests to identify successful pupils and those that require more work; and structured, self-contained corrective exercises that provide alternative learning cues and additional practice opportunities. The instructional units address the objectives assessed by the CRT's, and by using this material teachers can help students master objectives at an acceptable rate.

... Field Testing and Revision ...

The Chicago Mastery Learning model promotes success by combining the teaching efficiency of group instruction with the precision of individualized remediation to those who require alternate learning opportunities. In addition, the CMLR units ensure success because they were field-tested and revised until they did so. Through our model of development and field-testing, we assume the responsibility for Mastery Learning results rather than impose the burden on teachers or pupils. We have found, for example, that Mastery Learning instruction in elementary reading is not practical if 50-60% of the pupils do not achieve mastery by the time of the formative test. Therefore, if a sequence of instructional activities does not produce these results in our field-test classrooms, we redesign the sequence until it does. Similarly, if the remedial instruction does not lead another 20-30% to mastery, we revise it accordingly.

In order to achieve successful results, we have built a number of other features into the materials, most notably a distinctive instructional sequence, and specific learning strategies instruction, including structure of text information.

...,

... Instructional Sequence ...

1. Instructional Sequence: To accommodate deficiencies in prior learning as well as the learning needs of slower learners, each unit is carefully designed and sequenced. Initial activities require almost no prerequisites, with little or no reading, a great deal of teacher direction, simple, concrete content, and structured respones. Each subsequent activity is progressively more difficult and more abstract, and with fewer instructional supports. The number of activities per unit and the degree of difference between them are determined during field-testing.

... Learning Strategies ...

2. Learning Strategies: In addition to teaching the reading objectives, the units incorporate the teaching of specific learning strategies: a variety of mental operations for organizing memory, solving problems, and facilitating comprehension. For younger pupils, these stategies and procedures are modeled in the instructional presentation. In the materials for upper elementary pupils (grs. 5-8), the strategies are explicity taught through the use of adjunct questions and paradigms. Included among these paradigms is information about the structures of textual materials. The instruction focuses explicitly on the higher cognitive skills, promoting development of what Bloom calls "learning to learn." Pupils are taught how to think about the problem and thus gain confidence to confront new learning situations.

With these features, and the Mastery Learning model itself, we have been able to virtually guarantee success to teachers who use the materials. And the results from a variety of settings and conditions suggest that with the materials, teachers are able to solve the molecular problem of schooling and achieve success in the classroom.

... Mastery Learning at May School ...

Through field-testing and limited implementation and experiments, plus three years of Mastery Learning summer schools, many Chicago teachers and most principals have had experience with or are knowledgeable about the CMLR materials. Yet it is only in this current school year that most Chicago schools have quantities of the materials available for use. And only for the first time next year will the complete K-8 instructional system be ready for use in Chicago. Thus, most of what we can say about the effects of CMLR instruction is based on extrapolation from current data and experience. But one school, the May Elementary School, located on what one reporter has called "Chicago's tough west side," has implemented the materials throughout the school over the last two school years. The results this last year, the only year of full implementation, indicated the kind of school-wide improvement that the principal was seeking. Ironically, the characteristics that made May School "successful" correspond directly to the items on the school improvements checklists. What is ironic is that at May school, at least, these characteristics occurred naturally as effects of instructional improvement rather than as causes of school improvement. This is what leads us to suspect that a technology for effective instruction can also be a technology for effective schools.

... Problems at May School ...

Three years ago, before the current

principal and reading coordinator arrived and began to implement CP/ML, May school was a typically poor, inner-city school. It served over 1400 pupils, all of whom were black, and the majority of whom were from poverty-level families. Even with ESEA Title I assistance, eighth-graders graduated with barely more than a fifth grade reading ability. Student transiency and absenteeism were very high, and the suspension rate was the highest in the city. Parents would not come into the building, and teacher absenteeism indicated a similar feeling about the school. Staff development time and monitoring devices were available, but the expectation of failure was debilitating.

The new administrative team came to May School with the solid conviction that these children could learn, and with the belief that the CP/ML program could be used to achieve success. They organized the school and classrooms according to reading levels and conducted in-service training on the program. But because they were unable to find instructional materials that were effective in helping pupils master Chicago's continuum of objectives, their efforts were initially unsuccessful.

... Success With CMLR ...

Then the reading coordinator had the opportunity to use the CMLR materials in Chicago's mandatory summer review for 8th grade students unable to meet promotion requirements. As he taught complex units (on "inferences," "mood and tone," "main idea and details," etc.) to perennial reading failures, he experienced the basic phenomenon of CMLR. The class as a whole responded quite favorabley to the instruction. Pupils attended to instruction, worked to pass the formative tests, and redoubled remediation efforts to take the "second chance." The teacher said they "pushed" him, mastering units far faster than he expected. The whole class was not only succeeding, but enjoying class in the process.

... A Larger Pilot Study ...

The following year, the materials were piloted in three classrooms of eighth-graders at May to help prepare them for graduation. These teachers were all volunteers; no effort was made to recruit additional participants, though Mastery Learning staff did provide general in-service training to the faculty so that they would know about the pilot project. The reading coordinator reproduced materials for and assisted and monitored the pilot teachers. These teachers also experienced success. Teachers and pupils were enthusiastic about the materials and the classrooms averaged a 1½ year gain on the reading comprehension subtest of the Iowa Test of Basic Skills (ITBS).

... Large-Scale Implementation ...

Last year, the principal arranged to have the materials available for most instructional levels in order to implement Mastery Learning school-wide. As he and his coordinator implemented these materials, they naturally instituted and developed the activities, procedures, and attitudes of effective schools:

1. First, they marshalled resources so that they could reproduce the materials for the teachers who, in turn, could direct their attention to instruction.

2. Second, they introduced the faculty to the philosophy, the materials, and the new procedures. They established high expectations by stating that the goal of the program was one year's progress for each child - the dream of an inner city school. In addition, the reading coordinator gave teachers explicit training on the use of the CMLR materials.

3. Third, during the course of the year, both principal and coordinator monitored class progress. The coordinator observed instruction, providing assistance and even demonstrating teaching techniques. The coordinator used frequent meetings between the principal, the teacher and himself to assess overall progress and to identify and solve individual learning problems.

4. Fourth, they placed a great deal of emphasis on the importance of progress and success. Wall charts in the classrooms displayed the mastery of individual objectives, with the mastery of a reading level set aside as a special occasion. Pupils received a certificate of progress and a free paperback book for such an accomplishment in a special ceremony in the principal's office! Pride and and honor are not only an important part of a successful Mastery Learning program but also of a successful school.

5. Finally, parents were welcomed as part of the instructional team. Thus, even though they had previously refused to come into the building,

last year parents were at May school often - for conferences and awards, to find out how to help at home, to help tutor, to run the ditto machine. Everyone wanted to share in the success experience.

... May School Revitalized ...

As a result of these activities and of the pheonomenon of students achieving success using CMLR materials, May School became a revitalized institution last year. As teachers began to work their way through the units and as students began experiencing success, an excitement about school and learning began to emerge. Teachers who had been absent every other Friday and on the Mondays after payday began to come to school every day. Children began to come to school more regularly and perfect attendance certificates were eagerly sought. Instead of transiency, some May students who had moved outside the school attendance area rode public transportation in order to remain at May. Classroom disruptions and school suspensions became so rare that the principal did not have to maintain a specific disciplinarian. Social studies and science texts which had been previously unused suddenly became "readable" to the pupils, and instruction of the balanced curriculum became routine instead of an impossible dream.

... Test Data Confirms Success ...

The test data from the 1980 annual city-wide administration of the ITBS confirmed the success of the program, as predicted by Mastery Learning theory, and indicated the effects of successful school management as well. In summary, eight-, nine-, and ten-year-olds throughout the school averaged an eight months' gain, in comparison to two, three, and six months' gains the year before. The older children did even better, averaging over one year gain at each age cycle. Furthermore, this jump in average school gain was accompanied by a dramatic decrease in the variation of gains - one of the central tenets of Mastery Learning and a rarity in school outcomes.

Analysis of the distribution of classroom gains reveals a similar increase in the mean gain coupled with a decrease in variance over the year before. The proportion of classes with gains equivalent to a year or more increased from 37% in 1979 to 47% in 1980. And the correlation of classroom pre-test score to average gain fell from a significant r = .34 in 1979 to a nonexistent r = .03 in 1980: Thus, the gains reflected effective instruction in 1980 and not the accumulated effects of prior learning. By the end of the year, the principal had only a handful of teachers who required closer monitoring and assistance. He had managed to use Mastery Learning techniques at the school level to identify and correct classroom learning problems.

... Implications ...

At the end of the 1979-80 school year, because the May school principal was able to pull a few strings, 11 graduating pupils were placed in one of Chicago's "elite" selective enrollment high schools. This last year, 10 students were accepted at Lane Technical High School and 35 were accepted at Westinghouse Vocational. These are excellent schools and these children, who represent one-third of their graduating class, will have decidely better lives as a result of attending them.

... Students Benefit ...

We believe that Chicago's Mastery Learning Reading Program has important implications for both the theory and practice of education. But the importance of the program only has meaning in terms of children's lives. We believe that the CMLR gives teachers and principals a practical tool for improving schools by helping children in the classroom.

REFERENCES Austin, G. R. "Exemplary schools and the search for effectiveness." Educational Leadership, October, 1979.

Brookover, W. V. & Lezotte, L. W. Changes in school characteristics coincident with changes in student achievement. East Lansing, Michigan: Michigan State University, College of Urban Development, 1977.

Clark, D.L., Lotto, L. S., & McCarthy, M. M. "Factors associated with success in urban elementary schools." Phi Delta Kappan, March, 1980.

Coleman, J. S. et al. Equality of educational opportunity. Washington, D. C.: U. S. Government Printing Office, 1966.

Edmonds, R. & Frederikson, J. R. Search for effective schools: The identification and analysis of city schools that are instruction-effective for poor children. Cambridge, Mass.: Harvard University Center for Urban Studies, 1978.

Edmonds, R. "Effective schools for the urban poor." Educational Leadership, October, 1979.

Jencks, C. et al. Inequality: A reassessment of the effect of family and schooling in America. New York: Basic Books, 1972.

Jensen, A. "How much can we boost IQ and scholastic achievement?" Harvard Educational Review, 1969, 39, 1-123, 449-83.

Klitgaard, R. E. & Hall, G. A statistical search for unusually effective schools. Santa Monica, Calif.: The Rand Corporation, 1973.

Weber, F. Inner city children can be taught to read: Four successful schools. Washington, D. C.: Council for Basic Education, 1971.

APPENDIX A

From the Chicago Tribune, June 1980, "A checklist: how to tell if a school is teaching," by Casey Banas.

The Washington-based Council of Basic Education has developed a 67 point checklist to determine if a school is effective. If a school can answer "yes" to these questions, the council says, students are probably learning at capacity. Here are some of the questions:

Principal's leadership: Does the school have a clear, well-written, concise statement of specific instructional goals? Is the principal authoritative, decisive, and firm? Does the principal seek ideas and suggestions from the rest of the staff? Does the principal fairly enforce rules and decisions for everyone? Is at least half the principal's time devoted to supervising instruction, visiting classes, and responding to such visits? Does the principal hold high expectations of academic achievement for the staff and students?

Academic achievement: Does the curriculum include requirements in all the basic subjects: English, mathematics, science, history, government, geography, foreign languages, and the arts? Are elective subjects supplements to, rather than substitutes for basic subjects? Is homework regularly assigned and checked? Are academic problems diagnosed early and dealt with promptly? Are learning results stressed over teaching methods? Are there checks for student mastery of basic skills and knowledge? Are the standards for promotion and graduation understood by all? Is promotion based on scholastic achievement rather than time spent at one grade level? Does early elementary reading stress phonics? Do all courses require students to write? Are textbooks selected to meet predetermined curricular objectives?

Assessment of student progress: Is there a coherent plan for regular assessment of students, individually and collectively, especially in the basic subjects? Are the purposes of testing clearly understood? Are students tested only on what is actually taught (which is not always identical to the written curriculum)? Are students, parents, teachers, board members, and citizens satisfied with academic achievement in the school?

Teachers: Are teachers confident that all children can learn? Are they enthusiastic about teaching and learning the basic subjects? Do teachers agree with curriculum policies and priorities? Do they agree on education philosophy and approach? Are they good models of conduct and academic commitment? Are teachers well-prepared for class? Do they start and end class promptly?

Orderliness: Has the school published statements of expectation and norms for the conduct of staff and students? Are such statements widely understood and accepted? Do students have positions of responsibility for student activities, conduct, and school property? Are students praised for good performance? Does the staff display consistent values and practices throughout the school, as opposed to having idiosyncratic norms in each classroom? Do students sense that staff members genuinely care about their well-being?

Is the tone of the staff businesslike and professional, yet interested in students? Does the staff spot disorders early and respond quickly and firmly? Are reprimands delivered quietly, without disrupting class? Are parents notified of discipline problems with their children? Does the school keep useful records for delinquency, truancy, disruption, vandalism, tardiness, and other kinds of anti-school behavior?

Parental support: Do parents, school board members, and other citizens have access, as appropriate, to school records, teachers, administrators, and classes? Are policies on relations with parents and the community clearly

stated? For example, do parents understand the importance of study time free from TV and other distraction, and of reading aloud to children? Does the school have a handbook for parents? Does the school teach parents about the uses and abuses of standardized testing? Are parents and other citizens encouraged to exercise their legitimate shares of authority over school policies, priorities, and curriculum?

A CHECKLIST
FOR EFFECTIVE MASTERY LEARNING/STRATEGY INSTRUCTION

BY
BEAU FLY JONES
MASTERY LEARNING PROJECT
CHICAGO PUBLIC SCHOOLS

CRITERIA FOR THE OBJECTIVES AND THE TESTS

(Check P for Present or A for Absent)

1. The objective should identify the text and the format of the test situation. P__ A__

2. The objective should specify clearly exactly what the learner will do. P__A__

3. The objective should be consistent with the pretest (if there is one), the instruction, the formative test, and the summative test. P__A__

4. Pretests and post tests should parallel each other in the following dimensions:

a. test format (multiple choice, completion, and the like) P__A__

b. coverage of skills P__A__

c. level of processing (literal, inferential, etc.) P__A__

d. content difficulty with regard to

1) degree of concreteness (concrete vs abstract) P__A__

2) degree of familiarity of topic and vocabulary words P__A__

3) degree of explicitness (explicit, not requiring inferences, vs inexplicit, requiring inferences) P__A__

4) the distance between sentences or phrases which need to be integrated for comprehension; i.e., elipsis P__A__

5) the presence of effective context clues P__A__

e. difficulty of syntax with regard to

1) the number of compound and complex sentences P__A__

2) the number of syllables of unfamiliar words P__A__

3) the number of negatives P__A__

4) the distance between pronouns (e.g., it, this, some) and the nouns to which they refer P__A__

f. design features

1) the presence of graphic or pictorial representations P__A__

2) the distance between the reference to the representation and the representation itself P__A__

3) the extent to which the representation reflects the meaning of the text P__A__

g. structure of text with regard to

1) the purpose of the text (narrative, expository, or argumentative) P__A__

2) the underlying organizational structure of individual paragraphs or sections as subordinate (e.g., name/attribute), coordinate (e.g., compare-and-contract, and sequential (e.g., steps in a series) P__A__

3) the text length P__A__

4) the number of component parts (simple vs. complex) P__A__

5) the presence of organizational cues indicating sectional topics (e.g., subtitles, numbered paragraphs) P__A__

6) the presence of emphasis devices to highlight important information (e.g., italicized words) P__A__

CONSISTENCY OF INSTRUCTION AND ASSESSMENT

5. Instruction should provide experience in processing the type of information and mode of presentation used for assessment. P___A___

6. Objectives involving performance outcomes should involve practice in that performance in the specified test condition P___A___

7. The diverse parts of the instructional texts should be clearly labeled. P___A___

8. The functions of each part should be clearly specified to the student so that he/she is fully informed about which parts are essential for the desired outcomes. P___A___

INSTRUCTION TO THE OBJECTIVE

9. Instruction should involve the following:

   a. some activity to establish mental set/-motivation P___A___

   b. preteaching difficult vocabulary mnemonics wherever possible P___A___

   c. relating new information to prior experience by advance organizers, analogies, discussion P___A___

   d. clear input (see 10 below) P___A___

   e. clear examples, and where possible, non-examples P___A___

   f. guided practice P___A___

   g. independent practice; discrimination tasks P___A___

10. Each type of text or performance demonstration should display the appropriate features:

   a. Steps in a procedure and series of events should be clearly differentiated by use of different sentences, numbers, context clues, or other emphasis devices P___A___

   b. Texts/demonstrations describing concepts or vocabulary terms should present the critical features and identification of these features missing from non-examples. P___A___

   c. The key elements in problem/solution, cause/effect, compare/contrast, conflict/resolution, texts/demonstration forms should be clearly identified by emphasis devices such as using italics for the word "problems.". P___A___

   d. Description of parts of items in a category (e.g., parts of weapons) should be clearly identified by labels, and, wherever possible, displayed by tables with the names (e.g., barrel shape, triggering device) as row headings. P___A___

11. Graphic representations should have the following characteristics:

   a. They should reflect the meaning of the text. P___A___

   b. Each component part should be labeled. P___A___

   c. The label (itself, not a number or letter) should be near the part. P___A___

   d. The labels at best should be organized by area or sequence. P___A___

   e. Each figure should have a title which clearly explains the nature of the figure or the variables. P___A___

   f. Each graphic representation should have an explanatory text physically adjacent to the representation which tells the reader what is being displayed (e.g., what to notice or look for.) P___A___

   g. Each representation should be complete by itself (without reference to other representations or texts other than the adjacent explanatory text). P___A___

12. The learner should be provided with:

   a. information about the structure of text P___A___

   b. information about the appropriate information processing strategy (such as paraphrasing, underlining, note-taking, summarizing) with instruction in how to apply each one to the appropriate text P___A___

   c. where appropriate, memorization guidelines P___A___

   d. test taking strategies P___A___

e. "thinking aloud" models in the text or in the words of the instructor P___A___

f. guided practice in applying the strategy to the text P___A___

g. independent practice P___A___

13. All instructional texts and practice should address the objective directly:

a. flow charts are appropriate for sequential charts P___A___

b. tables are appropriate for name/attribute information P___A___

c. hierarchical networks are appropriate for hierarchically organized information P___A___

d. linear outlines are appropriate for all of the above texts and also others such as for opinion/reason and argument/fact texts P___A___

14. All practice exercises should be corrected by any procedure which allows the learner:

a. to understand why an error was made P___A___

b. to correct the incorrect information P___A___

15. Each unit of instruction should have a diagnostic test, prior to the exit test, to identify who is ready for mastery and who needs remediation P___A___

DIAGNOSTIC TEST (FORMATIVE TEST)

16. This diagnostic test should be parallel to the exit test:

a. in text structure and content P___A___

b. in test format P___A___

c. in mastery level P___A___

ENRICHMENT AND REMEDIATION

17. Those who pass the diagnostic test should be provided with the enrichment activity that extends the concept or skill taught, a library book for silent reading, or a peer tutoring option. Those who fail the formative test are to be given a corrective activity that has the following:

a. a review of the key information P___A___

b. additional practice P___A___

c. a different teaching/learning strategy P___A___

CRITICAL TEXTUAL CHARACTERISTICS

18. Print should not be extremely small or large (Courier 12; 12 pitch is ideal) P___A___

19. Passages and paragraphs should be labeled with headings and subheadings which follow the author's outline. P___A___

20. All new terms, acronyms, and abbreviations should be emphasized and defined immediately after their introduction. P___A___

21. Acronyms and vocabulary should be defined in simple, easy to understand terms which do not require a dictionary. P___A___

22. Acronyms, pronouns, and indefinte articles should be adjacent to the referents to which they apply. P___A___

23. There should be no more than two to three acronyms per page; preferably one to two or less. P___A___

24. Acronyms and technical terms not used for two to three pages should be redefined. P___A___

25. Vocabulary should be appropriate to grade level or minimum fifth or eighth grade standard. P___A___

26. Only relevant details should be presented. P___A___

27. Difficult to pronounce vocabulary should have phonetic guide(s). P___A___

28. Every paragraph should have an explicit topic sentence that tells the reader what the paragraph is about. P___A___

29. Information should be presented in a concise, logical fashion. P___A___

NOTE: A checklist is not a technology in and of itself. However, developing one is a good first step to evaluating the current program. Simultaneously, the same checklist may be used as guidelines for constructing a new instructional program or revising the old one.

Prepared in
The Department of Curriculum
Chicago Mastery Learning Reading Program
January 1981

THE IMPLEMENTATION AND EVALUATION OF MASTERY LEARNING PROGRAMS

BY
THOMAS R. GUSKEY
DIRECTOR OF RESEARCH
THE CENTER OF TEACHING AND LEARNING
CITY COLLEGES OF CHICAGO

Today I would like to address four very practical areas concerning the implementation and evaluation of Mastery Learning programs. In each area I will discuss what I believe are very important issues to be considered when applying Mastery Learning strategies and assessing their effectiveness.

First, I would like to describe what Mastery Learning means for teachers, and the problems administrators must be sensitive to when they begin implementating a Mastery Learning program. Second, I would like to describe what Mastery Learning means for students; what it means for their learning and for their perceptions of themselves as learners. Third, I would like to describe some of the concerns that typically arise during the initial stages of implementing a Mastery Learning program or any new program. Finally, I would like to outline some ways in which an institution or educational system might go about evaluating the effectiveness of a Mastery Learning program.

... Teachers Concerned About Quality of Instruction ...

For the past six years, a great deal of my time has been spent talking and working with teachers and administrators from a wide variety of educational institutions. Throughout those years I have consistently found that teachers at all levels are very much concerned with the quality of instruction they are able to provide. They want to do a good job, and they are very concerned about helping their students to learn.

However, these teachers face many problems. They are generally aware that their students have different learning styles and that while one approach to instruction may be appropriate for some students in a class, it may not be appropriate for others. These teachers would like to provide more individualized instruction for their students, but they realize that the conditions in most classrooms restrict the application of individualized programs. For instance, in most individualized programs students work at their own pace. Under these conditions, self-directed fast learners typically progress very quickly while slower learners fall further and further behind. As a result, the difference in achievement levels between slow and fast learners becomes much greater at the end of the course than it was initially.

... Individualized Programs Create Management Problems ...

In addition, many individualized programs create serious classroom management problems for teachers. When a teacher is attending to the needs of a single student, the needs of the other 30 students must be put off for that time, and often the attention of these students is diverted from instructional activities. Furthermore, teachers are often expected to cover a given amount of content material within the time limits of the course. This is extremely difficult to manage when students determine their individual instructional pace.

... Teachers Turning to Mastery Learning ...

For a growing number of teachers from educational institutions across the country, Mastery Learning has provided a useful solution to many of these problems. Through the use of Mastery Learning, these teachers have been able to provide a higher quality of instruction for more of the students in their classes. They have been able to better individualize their instruction within the group-oriented setting of the classroom.

Mastery Learning is certainly not an educational cure-all. It is not going to solve all of the problems we face as educators. But I firmly

believe that Mastery Learning can be a very useful and very effective tool for teachers at any level of education.

... Mastery Approach Flexible ...

As a teaching-learning strategy, Mastery Learning can be adapted to broad ranges of instructional styles. In my work with school systems across the country, I have found that there is tremendous flexibility in the application of Mastery Learning. It is the underlying principles of Mastery Learning and the instructional procedures implied by these principles that make it such a powerful innovation.

As an example of how Mastery Learning can be used, let me tell you what I do in my classes. At the University, I teach the courses most graduate students in education are required to take, but dread: Statistics and Research Methodology. I use Mastery Learning in both of these graduate level courses.

... Orientation ...

On the first day of class I begin by explaining the process of Mastery Learning to my students. I indicate that I am confident that every student can make a final grade of "A," and that I am one of the toughest graders in the college. I inform them that the class will not be easy, but that they will be told exactly what they will need to do in order to succeed.

... Formative Tests ...

Throughout the course I continually review the Mastery Learning process with my students. I use a series of formative tests to provide my students with regular checks on their learning progress. These formative tests cover the concepts I have identified as important and provide both my students and me with feedback about their learning progress. I do not count these tests in grading my students. They are used primarily for diagnostic and prescriptive purposes. As you might guess, students are quite unfamiliar with this kind of instructional process and have some difficulty catching on in the beginning. But after the first few formative tests they begin to understand the process and really appreciate the opportunity to gain this kind of feedback on their learning progress, particularly in courses such as these.

... Correctives ...

After each item on a formative test, I indicate, in parentheses, three sources of additional information about the concept being assessed: page numbers in both the course text and workbook, and the date I presented the concept in class. Thus my students know precisely where to go for more information on important concepts. If students do not reach "mastery" on a formative test, which in my classes is 90 percent correct, I sometimes ask them to write a short paragraph explaining the concept behind each item missed. At other times I will have them develop three or four more questions that get at the same concept. With correctives as simple as these, most of my students are able to remediate their learning difficulties and hence succeed in the course.

Of course, this is only one way to use Mastery Learning. Because Mastery Learning is very flexible, teachers are able to adapt the procedures to their own instructional style, the constraints of their instructional situation, and the needs of their students. In fact, while visiting schools across the country, I have often found two Mastery Learning teachers teaching the same subject, at the same time of day, to the same kinds of students, yet implementing Mastery Learning very differently. Of course, there are many common elements: group instruction, a diagnostic/prescriptive test, feedback and correctives, and a check on the success of the correctives. But how the group instruction is handled, the format of the formative tests, and the procedures for correcting learning difficulties, are all likely to be different.

... Common Concerns Regarding Mastery Learning ...

Let us now turn to some of the common concerns teachers express when they are first introduced to Mastery Learning. One very common concern is: "What about the constraint of class time? I have a certain amount of course content that I must cover, and you are telling me that I now must extend each learning unit to include the feedback and corrective process. How will I ever get through it all?"

... Orientation Essential ...

Experience has shown that it is absolutely essential to use the first learning unit to orient students - to let them know that Mastery Learning is something different, with different expectations and different methods for evaluation. In addition, some class time during the first few units must be devoted to corrective work. Consequently these early units will take longer than usual. But as the term progresses and as students adjust to Mastery Learning procedures, the amount of time required in subsequent units will decrease.

... Mastery Students Spend More Time On-Task ...

Also, when beginning any course of instruction, a high percentage of students' time is spent "on-task," that is, doing work directly related to course objectives. But unlike traditionally taught classes where students' on-task time decreases as the course progresses, Mastery Learning students continue to be on-task for a major portion of their time in the course, thus increasing their rate of learning. Therefore, although Mastery Learning may require more class time initially, it will require less time later when students are familiar with the procedures and are spending their class time on-task. Most Mastery Learning teachers find that by the end of the term they are able to cover just as much material, if not more, than when using more traditional instructional methods.

... Fast Learners ...

A second common concern is: "What about those fast learners? There are often students in my classes who are really bright. If I use Mastery Learning, am I holding them back? Am I not limiting what they can do in the class?"

By regularly administering formative tests and allowing fast learners to demonstrate that they have mastered essential concepts, teachers can free these students to pursue other kinds of activities that they would not have had a chance to pursue under more conventional types of instruction. For example, fast learners can do a special project or become involved in extension or enrichment activities. Without Mastery Learning, they would have to sit through review activities with everyone else. Alternatively, these fast learners can further enrich their own understanding by serving as tutors for their slower classmates. Bright students such as these will continue to present a challenge for any teacher. But at the same time they are likely to have greater opportunities under Mastery Learning than under more traditional instruction.

... Higher Cognitive Processes ...

A third common concern has to do with higher cognitive processes. I often hear teachers ask, "Mastery Learning seems to fit very well with instruction geared to the development of basic skills, but is it effective in teaching divergent thinking skills, problem solving skills, and higher cognitive processes?"

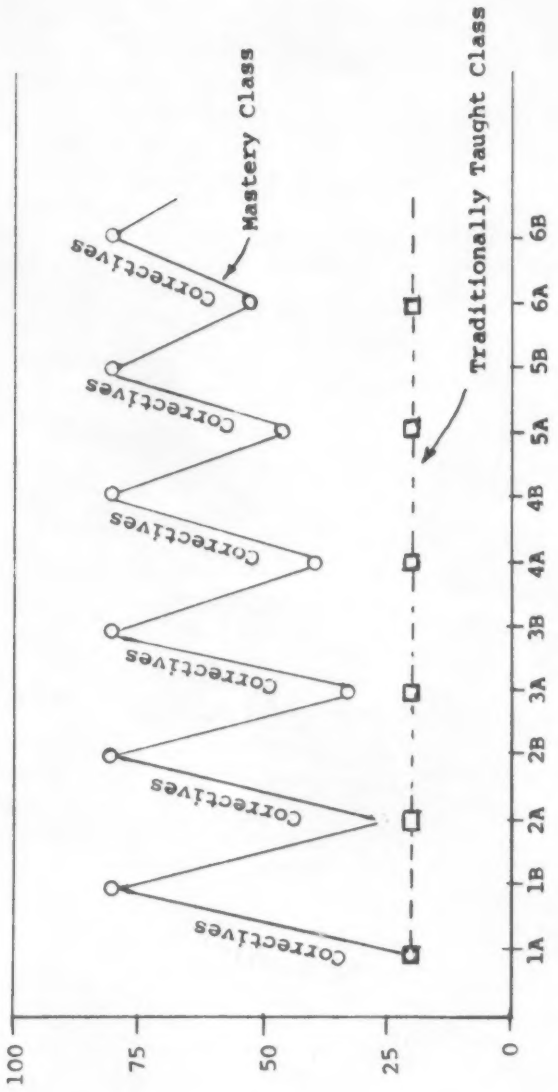
... Mastery Not Limited to Basic Skills ...

Although Mastery Learning works very well in courses designed to teach basic skills, it has certainly not been limited to these kinds of courses. In a large number of college and high school courses stressing the development of higher cognitive skills, Mastery Learning has worked quite well. For example, Mastery Learning has been successfully applied in courses in counseling, composition, and political science. When the objectives of a course and the focus of instruction are upon these higher cognitive skills, teachers must strive to find ways to help students practice and attain these skills. In courses such as these, Mastery Learning can still be a very useful instructional tool. Again, this is due in part to the flexibility of Mastery Learning strategies. In a composition class, a theme or other writing sample can certainly be used as a formative test, so long as the teacher specifies the criteria for successful performance and provides students with directed opportunities to correct their mistakes.

... Collecting Evaluation Evidence on Mastery Learning ...

Now let us consider how evidence can be gathered to evaluate the effectiveness of Mastery Learning. At the individual classroom level, it is usually helpful for teachers to chart the progress of Mastery Learning classes. Such progress charts are often displayed in the classroom, and under ideal conditions will look very much like the one shown in Figure 1.

Charts such as this clearly show how students are progressing through the course and how this progress is different from what we would expect in classes taught by more traditional strategies. Furthermore, a chart such as this often helps students see how Mastery Learning is working for them.



Theoretical Unit-to-Unit progress chart of Mastery and Traditionally Taught Classes.
Figure 1.

Regardless of the quality of the initial instruction, it is unlikely that every student will reach mastery on the first formative test. In fact, it is more common to find that the percent of students attaining mastery (usually 85% correct on a test) is about the same as in any other class: around 20 or 25 percent. However, the critical element in the success of Mastery Learning comes between the first and second formative test, when correctives are introduced. By the second formative test, a large majority of students in the class should attain that 85% mark.

By the second unit, a few more students will have become familiar with the instructional format and know what to do to prepare for the formative tests. Hence, a few more students are likely to attain mastery on the first formative test for that unit. This type of progress is likely to continue until by the end of the term, a majority of students in the class will reach mastery.

... Comparing Mastery and Non-Mastery Classes ...

In addition to evidence gathered from individual mastery classes, it is also useful to have teachers gather information from other types of classes for comparative purposes. There are several ways in which this can be done. One way is to have each teacher involved in the Mastery Learning program teach two sections of the same course. One randomly selected class is taught by whatever methods and procedures have been used in the past, the other by using Mastery Learning. While there are problems with this approach, particularly since the first class does not represent a true "control," it does allow each teacher to conduct a small individual experiment assessing the effectiveness of using Mastery Learning. This procedure was used in an initial evaluation of the Mastery Learning Program here in the City Colleges of Chicago (See Guskey and Monsaas, Research in Higher Education, 1979).

Another way to gather evidence on the effectiveness of Mastery Learning is to have teachers compare the achievement of past classes with present Mastery Learning classes. Since instructors often give the same or very similar final examinations, the average scores of students in both types of classes can be compared if, of course, the same grading procedures are employed.

Still another means of comparison is to match the results of Mastery Learning classes with similar classes taught at the same time. Most likely these classes will be other sections of the same course taught by different faculty members not using Mastery Learning. In this case, instructors should try to determine if each of the sections has comparable types of students. This can be done by administering a standard pretest in all sections. Then a common final examination or other type of standard achievement test can be used to assess the effectiveness of Mastery Learning instruction.

... Evaluating Mastery Programs ...

When evaluating Mastery Learning programs, teachers should collect at least two kinds of cognitive or achievement data. The first is the results from the formative tests. This information should be gathered so that the percent of students in the class attaining Mastery can be regularly checked. Based upon this information, the effectiveness of the initial instruction and the corrective activities can be judged. Specific revisions can then be made to improve both the instruction and corrective procedures.

The second kind of cognitive data to be collected should come from the results of summative examinations, particularly midterms and finals. This information should be gathered not only for grading and evaluation purposes, but also for comparisons with other "control" classes.

... Affective Variables ...

Another important source of information concerns affective variables. It is often very useful to construct a short questionnaire designed to determine how students feel about the subject and how confident they feel of themselves and their ability to learn. These questionnaires might simply consist of statements which are rated by students from "strongly agree" to "strongly disagree" - statements such as, "I feel I could do well in another course in this subject area," or "I am fairly confident of my ability in this subject." By administering this questionnaire both at the beginning and at the end of the course, teachers will be able to determine if there has been any change in these affective areas. If you write to me, I would be glad to send you samples of instruments which have been developed for this purpose.

... Implementing a Mastery Learning Program ...

Here are some specific considerations to keep in mind when implementing a Mastery Learning program. We often make the mistake of trying to convince teachers to adopt a new educational innovation such as Mastery Learning by talking at great length about what it is going to mean for their students. Unfortunately, this is usually not very effective. Before teachers can begin to seriously evaluate what a new program is going to mean for their students, they must resolve their personal concerns about what the new program is going to mean for them.

... Concerns Based Adaptation Model ...

In my work helping to implement Mastery Learning programs, I have found particulary useful a Concerns Based Adaptation Model which divides concerns about a new program or innovation into three levels. The first of these levels is that of personal concerns. When teachers first learn of a new program, their primary concern is how this new program is going to affect them personally. At this time they are likely to ask questions such as, "How much extra work is Mastery Learning going to mean for me? How much time is it going to require? How much do I have to do that is different from what I am doing now?" It is only after these issues are addressed and these personal concerns resolved that teachers are ready to consider the next level of concerns: management concerns.

Management concerns relate to the day-to-day operation of the new program or innovation. At this level questions are raised such as, "How do I get Mastery Learning to work in my classroom? How can I best handle the feedback process? How do I motivate students to do the correctives?" Again, only after these kinds of concerns have been resolved are teachers ready to seriously consider a final level of concerns: impact concerns.

Impact concerns relate to the effects of the new program or innovation upon students, courses or entire school systems. The most common questions now become, "What is Mastery Learning really going to do for my students? What kind of results can I expect in my class? How does what I am doing relate to what other Mastery Learning teachers do?"

... Focus on Personal Concerns First ...

When we begin the implementation of a new educational program, we often focus too much upon concerns related to overall goals and directions (impact concerns) and not enough upon the very personal concerns of the teachers, counselors and administrators who will work in the program. My own research indicates that these individual personal concerns can never be fully resolved prior to the actual implementation of a program. But at the same time, I do not believe we can neglect these concerns if we hope for the program to be successful.

... The Teacher's Classroom Role ...

Finally, let me mention what I believe to be one of the most positive aspect of Mastery Learning. The implementation of Mastery Learning implies a very significant change in the teacher's role in the classroom. Under more traditional instructional methods, learning is a very competitive activity. Students are compelled to compete among themselves for a few scarce rewards (high grades) to be given out by the teacher. Grading is done "on-the-curve" and, thus, helping a classmate can be detrimental to a student's own chances for success. Under these conditions the teacher becomes a referee whose primary responsibilities lie in governing the competition and classifying students.

... Cooperative, Not Competitive, Learning ...

Under Mastery Learning, however, learning becomes a cooperative rather than a competitive activity. Students and the teachers are now both on the same side, out to "master" what is to be learned. Because students are evaluated in terms of what they have learned instead of their relative standing among classmates, they can become involved in helping one another instead of competing with each other. In fact, many teachers find that peer-tutoring occurs spontaneously. Under these conditions, teachers become instructional leaders and learning facilitators rather than simply managers of the competition. A challenge? Certainly, but an exciting one to say the least.

... Conclusion ...

I hope this conference has served to stimulate and enrich your understanding of Mastery Learning. I hope it has served to broaden your perspective on these ideas. But, most importantly, I hope that you have become excited about the challenges which lie before us in the research and application of Mastery Learning.

REFERENCES

Guskey, T. R. and Monsaas, J. A. "Mastery Learning: A Model for Academic Success in Urban Junior Colleges." Research in Higher Education, 1979, Vol. 11, No. 3, 263-274.

MAY 7 1982

Mastery learning can improve student performance and reduce attrition--two key issues facing education today. You are invited to attend the Third Annual Mastery Learning Conference sponsored by the City Colleges of Chicago and to observe first-hand how this techique can be applied with success. A three-day conference will be held May 26, 27, and 28, 1982, in Chicago's Palmer House. It has been planned in response to the wide acceptance, of the Conferences of the last two years. If you are familiar with mastery learning, join us for an expanded and in-depth Conference featuring special workshops and seminars on the administrative, research, and theoretical aspects of mastery learning. If you are new to the concept, plan to capture the excitement of mastery learning in the classroom and learn how it can improve learning for your students and yourself.

FOR ADDITIONAL INFORMATION
WRITE OR CALL:

Dr. Rocco S. Caponigri, Director
CCC Mastery Learning Project
Faculty-Staff Center, Rm. 1712
Chicago City-Wide College
185 North Wabash Avenue
Chicago, Illinois 60601

312/977-2568

UNIVERSITY OF CALIFORNIA
ERIC CLEARINGHOUSE FOR
JUNIOR COLLEGES
96 POWELL LIBRARY BUILDING
LOS ANGELES, CALIFORNIA 90024
EE 36

MAY 7 1982